Appendix A **– Hewlett-Packard Company ("HP")**[1]

The following chart is based on information known to date. Plaintiff Network-1 reserves the right to amend and update this chart as additional information is obtained and analyzed.

Plaintiff Network-1 contends that HP (A) directly infringes, (B) contributorily infringes, and (C) induces infringement of the Asserted Claims. Plaintiff Network-1 contends that HP:

(A) directly infringes the Asserted Claims by

(1) practicing a method for remotely powering access equipment in a data network that satisfies all of the claimed elements as described below; and

(2) making, using, selling, or offering to sell an apparatus for remotely powering access equipment in a data network that satisfies all of the claimed elements as described below.

In directly infringing the Asserted Claims by practicing such a method or making, using, selling, or offering to sell such an apparatus, (a) the power sourcing equipment[2] (data nodes)

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[1] Consistent with P.R. 3-1(c), Network-1 contends that the following chart provided for HP is sufficient to "identify[] specifically where each element of each asserted claim is found within each [HP] Accused Instrumentality" (P.R. 3-1(c)) because the analysis of each element for purposes of Network-1's contentions relating to HP's Accused Instrumentalities "would be identical for each product." *See Juxtacomm Techs., Inc. v. Ascential Software Corp.*, 2008 U.S. Dist. LEXIS 36590 *5-6 (E.D. Tex. May 2, 2008).

[2] The IEEE 802.3 standards (including 802.3af and 802.3at) use their own terminology to describe what is referred to in the '930 Patent as the (a) "data signaling pair," (b) "data node," and (c) "access device:"

"1.4 Definitions …

- 1.4.x Twisted Pair Medium Dependent Interface (TP MDI): The mechanical and electrical interface between the transmission medium and the Medium Attachment Unit (MAU) or PHY, *e.g.*, (10BASE-T, 100BASE-TX, or 1000BASE-T) [the "TP MDI" corresponds to the interface of the "data signaling pair" used in the claims of the '930 Patent].
- 1.4.x Power sourcing Equipment (PSE): A DTE or midspan that provides the power to a single link section. DTE powering is intended to provide a single 10BASE-T, 100BASE-T, or 1000BASE-T device with a unified interface for both the data it requires and the power to process these data [the "PSE" corresponds to the "data node" used in the claims of the '930 Patent].

and powered devices (access devices) used by HP can both be HP products (*e.g.*, an HP A3600 EI Switch and an MSM320 Access Point (US) (J9360B)), (b) neither can be HP products (that is, HP can use power sourcing equipment (data nodes) and powered devices (access devices) made by others), or (c) either the power sourcing equipment (data nodes) or the powered devices (access devices) can be HP products.[3]

(B) contributory infringes the Asserted Claims by making, importing, selling, and offering to sell

(1) power sourcing equipment (data nodes) that, when combined and connected to powered devices (access devices) that are either HP powered devices (access devices) or are powered devices (access devices) made by others, are designed, sold, and imported with the knowledge that they are especially made or adapted for use as a material part of a combination that (a) practices a method for remotely powering access equipment in a data network, or (b) is an apparatus for remotely powering access equipment in a data network, that satisfies all of the claimed elements as described below; and

(2) powered devices (access devices) that, when combined and connected to power sourcing equipment (data nodes) that are either HP power sourcing equipment (data nodes) or are power sourcing equipment (data node) made by others, are designed, sold, and imported with the knowledge that they are especially made or adapted for use as a material part of combination that (a) practices a method for remotely powering access equipment in a data network, or (b) is an apparatus for remotely powering access

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- 1.4.x Powered Device (PD): A device that is either drawing power or requesting power from a PSE [the "PD" corresponds to the "access device" used in the claims of the '930 Patent]."
  [N12530].

[3] In addition to making, using, selling, and offering to sell the identified power sourcing equipment (data nodes) and powered devices (access devices), HP also makes, uses, sells, and offers to sell other related equipment specifically designed to be used in connection with the power sourcing equipment (data nodes) and powered devices (access devices) in a data network that satisfies all of the claimed elements.

equipment in a data network, that satisfies all of the claimed elements as described below;

(C) actively induces infringement of the Asserted Claims by instructing others to use power sourcing equipment (data nodes) (made by HP or others), combined with and connected to powered devices (access devices) (made by HP or others), as suggested by HP's manuals, advertising, place cards, instructions, and other literature, to (a) practice a method for remotely powering access equipment in a data network, or (b) use an apparatus for remotely powering access equipment in a data network, that satisfies all of the claimed elements as described below.

Plaintiff Network-1 contends that each HP Accused Instrumentality is designed and functions consistent with the IEEE 802.3af[4] or 802.3at[5] Standards.[6] Sample statements demonstrating that the HP Accused Instrumentalities conform to the IEEE 802.3af or 802.3at Standards include:

- "Supports PoE power supply on 8 ports at the same time (IEEE 802.3af)." (HP A3000G Wireless Switch Series Data sheet) [N205069];

[4] The IEEE 802.3af Standard extends prior 802.3 Ethernet standards to support devices and interfaces for remotely powering access equipment in a data network. (IEEE 802.3af Standard) [N12517-12649]; "IEEE 802.3af is an extension to the existing Ethernet standards." (HP ProCurve Power over Ethernet (PoE/PoE+) Planning and Implementation Guide) [N237043].

[5] "Abstract: This amendment includes changes to IEEE Std 802.3-2008 to augment the capabilities of IEEE Std 802.3 with higher power levels and improved power management information." (IEEE 802.3at Standard Abstract) [N151839]; "Since the original introduction of PoE, the IEEE has initiated a new project called 802.3at which is commonly referred to as PoE+." (HP ProCurve Power over Ethernet (PoE/PoE+) Planning and Implementation Guide) [N237044].

[6] All components of the 802.3af Standard are now integrated into 802.3-2008 Standard.

- "IEEE 802.3af Power over Ethernet (PoE): provides up to 15.4 W per port to IEEE 802.3af-compliant PoE-powered devices such as IP phones, wireless access points, and security cameras." (HP A3600 EI Switch Series QuickSpecs) [N205169];
- "IEEE 802.3af Power over Ethernet (PoE) support: simplifies deployment and dramatically reduces installation costs by helping to eliminate the time and cost involved in supplying local power at each access point location." (HP A5500 EI Switch Series QuickSpecs) [N205310];
- "General protocols: IEEE 802.3af Power over Ethernet." (HP IntelliJack Gigabit Switch Series Data sheet) [N206267];
- "General protocols …. IEEE 802.3at." (HP Intellijack Gigabit Switch Series Data sheet) [N206267];
- "Additionally, they support the PoE standard IEEE 802.3af, and the PoE+ IEEE 802.3at standard." (HP ProCurve Power over Ethernet (PoE/PoE+) Planning and Implementation Guide) [N237047];
- "IEEE 802.3at draft Power over Ethernet (PoE+) support: simplifies deployment and dramatically reduces installation costs by helping to eliminate the time and cost involved in supplying local power at each access point location." (HP A300G Wireless Switch Series) [N205066];
- "The switches provision their 10/100Base-TX ports with power for PoE applications compatible with the IEEE 802.3af standard." (Power Over Ethernet (PoE) Operation for the Series 2600-PWR Switches) [N238138];
- "is IEEE 802.3af PoE compatible" (HP A-802.11a/b/g Access Point Series – Product Overview) [N206598];
- "Power over Ethernet: IEEE 802.3af," (HP 4110 IP Phone – Quick Start Guide) [N239436];
- "IEEE 802.3af PoE" (HP 4110 IP Phone Models) [N238760].

Claim language	Contentions
Claim 6	
Pre: Method for remotely powering access equipment in a data network, comprising	*Sample evidence (HP statements, depictions, and other documentation) includes*:[7] • *See* elements [a] – [d] below; • "IEEE 802.3af Power over Ethernet (PoE): provides up to 15.4 W per port to IEEE 802.3af-compliant PoE-powered devices such as IP phones, wireless access points, and security cameras." (HP A3600 EI Switch Series QuickSpecs) [N205169]; • "Power over Ethernet technology allows IP telephones, wireless LAN Access Points and other appliances to receive power as well as data over existing LAN cabling, without needing to modify the existing Ethernet infrastructure." (HP ProCurve Power over Ethernet (PoE/PoE+) Planning and Implementation Guide) [N237043];

[7] The "*Sample evidence (HP statements, depictions, and other documentation)*" presented in this Appendix are illustrative examples of statements, depictions, and other documentation that help one understand and put into context the identification presented for each element. The identification presented for each element is in no way indented to be limited to the specific illustrative examples in such statements, depictions, and other documentation. For each claim element, the "sample evidence" identified in the Appendices of each other Defendant is incorporated by reference into this Appendix for each corresponding claim element.

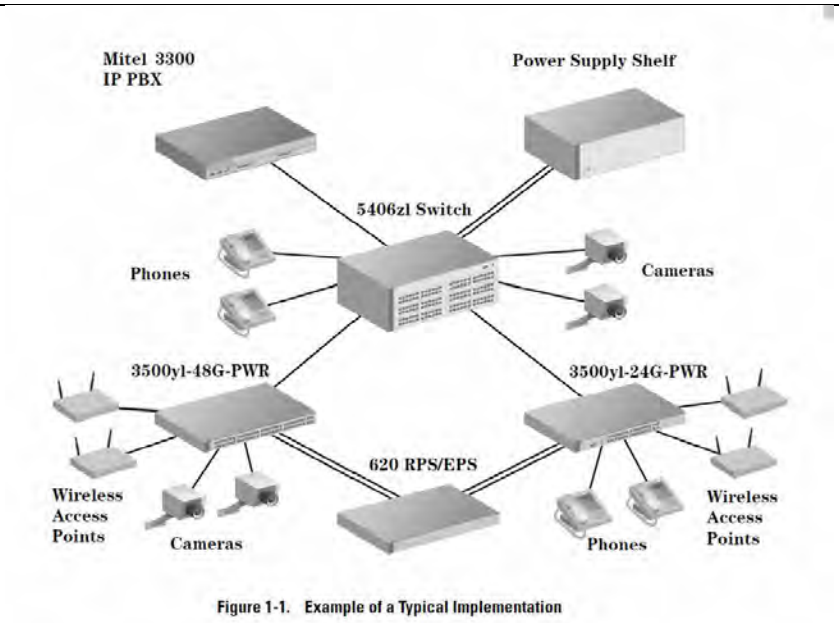


Figure 1-1. Example of a Typical Implementation

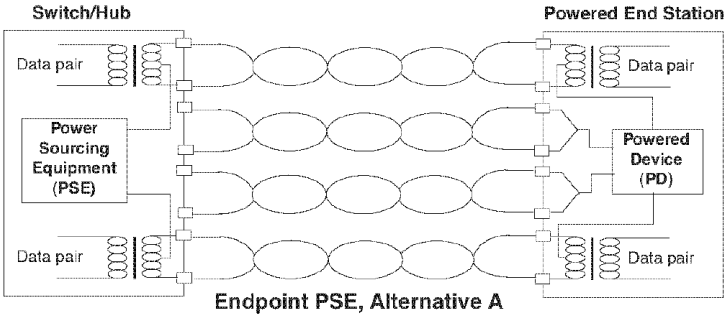
- (HP ProCurve Power over Ethernet (PoE/PoE+) Planning and Implementation Guide) [N237045]; (HP Power over Ethernet (PoE/ PoE+ Planning and Implementation Guide) [N289913];
- "They can supply power over a twisted-pair cable to power devices such as telephones, wireless access points, IP Gateways, and audio and video remote monitoring." (HP ProCurve Power over Ethernet (PoE/PoE+) Planning and Implementation Guide) [N237047];
- "The Switch 2520-8-PoE provisions (allocates power to) ports 1-8 with 128 watts of power for PoE applications compatible with the IEEE 802.3af standard. The Switch 2520-24-PoE provisions ports 1-24 with 384 watts of power for PoE applications compatible with the IEEE 802.3af standard." (HP ProCurve Power over Ethernet (PoE/PoE+) Planning and Implementation Guide) [N237076];
- "Power Over Ethernet (PoE) technology allows IP telephones, wireless LAN access points, and other powered

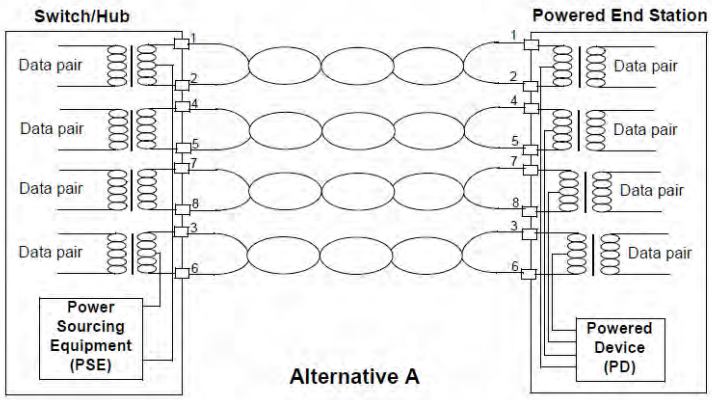
	devices (PDs) to receive power and transfer data over existing LAN cabling." (Power Over Ethernet (PoE) Operation for the Series 2600-PWR Switches) [N238138]; • "The PoE Ethernet switches are installed to supply power over the twisted pair LAN cables to run phones or other appliances as required." (HP Power over Ethernet (PoE) for zl and yl Products – Planning and Implementation guide) [N238350]; (HP ProCurve Power over Ethernet (PoE/PoE+) Planning and Implementation Guide) [N238402]. *802.3af, 802.3at, and 802.3-2008 Standards statements and depictions include*: • "Abstract: Support for optionally powering a 10BASE-T, 100BASE-TX or 1000BASE-T DTE device via the Power Interface (PI) using physical layers defined in Clauses 14, 25, and 40. The Power Sourcing Equipment (PSE) is located at an endpoint or midspan, separate from and between the MDIs, and provides power to the Powered Device (PD) over the Link Section." (IEEE 802.3af Standard Abstract) [N12519]; • "DTE powering is intended to provide a single 10BASE-T, 100BASE-TX, or 1000BASE-T device with a unified interface for both the data it requires and the power to process these data." (IEEE 802.3af Standard Definition 1.4x (PSE)) [N12530]; • "DTE powering is intended to provide a 10BASE-T, 100BASE-TX, or 1000BASE-T device with a single interface to both the data it requires and the power to process

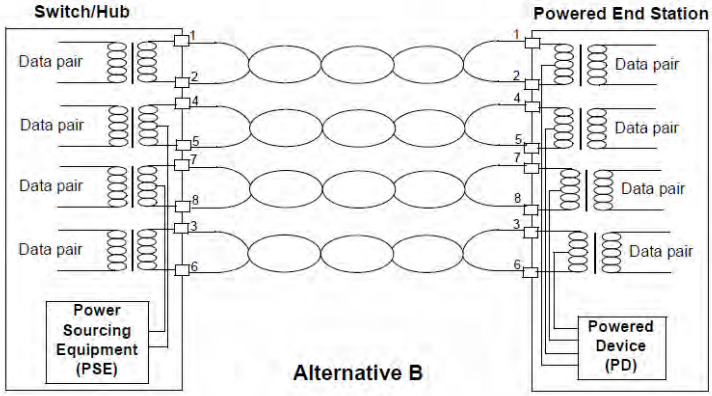
	this data." (IEEE 802.3af Standard 33.1) [N12555]; (IEEE 802.3at Standard 33.1) [N151872]. The IEEE 802.3af and IEEE 802.3at Standards extend prior 802.3 Ethernet standards to support methods and interfaces for remotely powering access equipment (*i.e.*, powered devices) in a data network, *e.g.*, 10BASE-T, 100BASE-TX, or 1000BASE-T networks. *Identification*: The preamble is a method for (a) "remotely powering access equipment," (b) "in a data network." • (a) remotely powering access equipment: Power sourcing equipment (data nodes, addressed below), made by HP or others, combined with powered devices (access devices, addressed below), made by HP or others, are used to practice a method for remotely powering access equipment (the powered devices, access devices) as addressed in elements [a] through [d] below. The "access equipment" is the powered devices (access devices) that access data and power through a network. Non-limiting examples of such access equipment include (a) phones (*e.g.*, IP phones), (b) wireless access points, (c) cameras (*e.g.*, security cameras), (d) magnetic card readers, and (e) video kiosks. Non-limiting examples of such access equipment are also listed in the main body of these Infringement Contentions and are identified as the Accused Instrumentalities for various Defendants under the headings: "*powered devices (access devices).*" • (b) in a data network: The "data network" refers to the

	Ethernet network that transmits data and power between power sourcing equipment (data nodes) and powered devices (access devices).
[a-1] providing a data node adapted for data switching	*Sample evidence (HP statements, depictions, and other documentation) includes*: • "The HP A3000G Wireless Switch Series are wired and wireless unified switches that integrate both the wireless controller and the 1000 Mbps Ethernet switch functions." (HP A3000G Wireless Switch Series Overview) [N205080]; (HP A3000G Wireless Switch Series Data Sheet) [N205065]; • "These Gigabit Ethernet switches deliver outstanding security, reliability, and multiservice support capabilities for robust switching at the edge or aggregation layer of large enterprise and campus networks or in the core layer of SMB networks." (HP A5500 EI Switch Series Data sheet) [N205279]; • "The HP ProCurve PoE switch devices are multi-port switches that can be used to build high-performance switched workgroup networks with PoE." (HP ProCurve Power over Ethernet (PoE/PoE+) Planning and Implementation Guide) [N237047]; HP ProCurve 2520 Switches The 2520 (J9137A), has 8 Integrated PoE auto-sensing 10/100Base-TX RJ-45 ports with two dual-personality Gigabit Uplink ports.  • (HP ProCurve Power over Ethernet (PoE/PoE+) Planning

	and Implementation Guide) [N237048]; • "PSE - Power-Sourcing Equipment. A PSE, such as the Series 3500yl Switches, or the modules in a 5400zl chassis, provides power to IEEE 802.3af or 802.3atcompliant PDs directly connected to 10/100/1000Base-T PoE RJ-45 ports on the switch." (HP ProCurve Power over Ethernet (PoE/PoE+) Planning and Implementation Guide) [N237187]; • "The PoE Ethernet switches are installed to supply power over the twisted pair LAN cables to run phones or other appliances as required." (HP ProCurve Power over Ethernet (PoE/PoE+) Planning and Implementation Guide) [N237045]; • "These switches are designed to be used primarily in wiring closets directly connected to computers, printers, and servers to provide dedicated bandwidth to those devices. Additionally, they support the IEEE 802.3af PoE standard, and the IEEE 802.3at PoE+ standard. They can supply power over a twisted-pair cable to power devices such as telephones, wireless access points, IP Gateways, and audio and video remote monitoring." (HP Power over Ethernet (PoE/ PoE+ Planning and Implementation Guide) [N289915]; • "The HP PoE switch devices are multi-port switches that can be used to build high-performance switched workgroup networks with PoE." (HP Power over Ethernet (PoE/ PoE+ Planning and Implementation Guide) [N289915]. *802.3af, 802.3at, and 802.3-2008 Standards statements and*

	depictions include: • "Power sourcing equipment. PSE, as the name implies, is the equipment that provides the power to a single link section. The PSE's main functions are to search the link section for a PD, optionally classify the PD, supply power to the link section (only if a PD is detected), monitor the power on the link section, and scale power back to the detect level when power is no longer requested or required." (IEEE 802.3af Standard 33.2) [N12557]; (IEEE 802.3-2008 Standard 33.2) [N236612];  Endpoint PSE, Alternative A (IEEE 802.3af Standard Figure 33-4) [N12558]; (IEEE 802.3-2008 Standard Figure 33-4) [N236613]; (IEEE 802.3at Standard Figure 33-4) [N151877];





(IEEE 802.3at Standard Figure 33-5) [N151878];

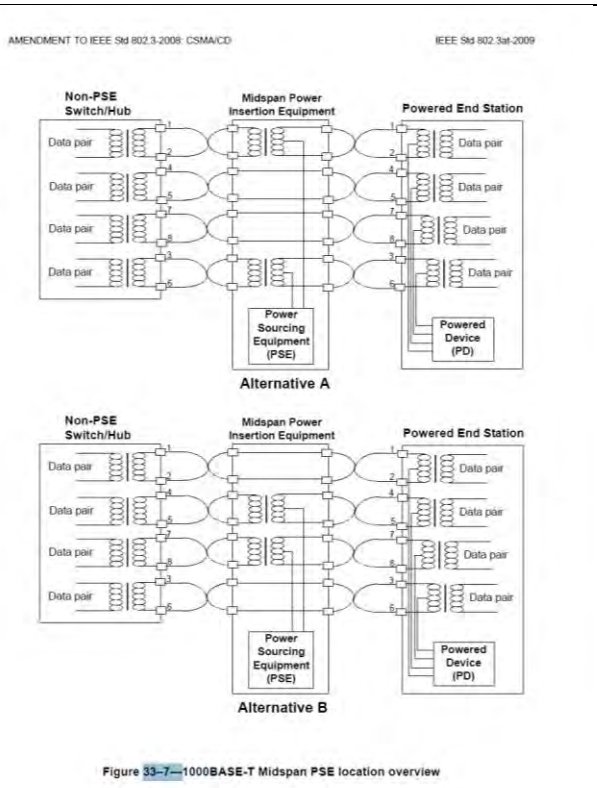


Figure 33–7—1000BASE-T Midspan PSE location overview

(IEEE 802.3at Standard Figure 33-7) [N151880];

- "The PSE is the portion of the end station or midspan equipment that provides the power to a single PD. The PSE's main functions are as follows: — To search the link section for a PD — To supply power to the detected PD through the link section — To monitor the power on the link section — To remove power when no longer requested or required, returning to the searching state." (IEEE 802.3at Standard 33.2) [N151875].

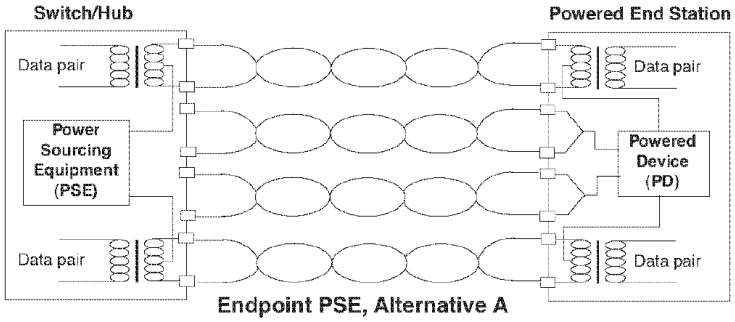
Under the IEEE 802.3af and 802.3at standards, HP's switches and routers are Endpoint PSEs (power sourcing equipment) which are data nodes adapted for switching.

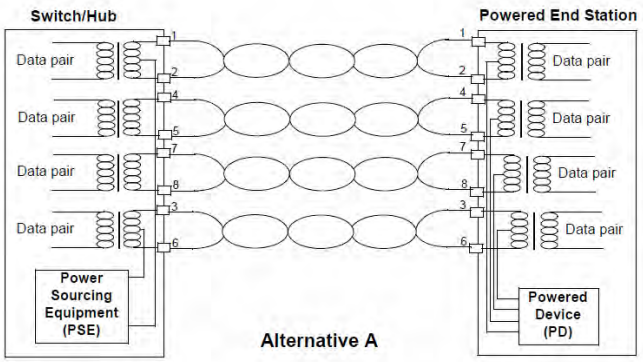
Identification: The "data node adapted for data switching" is each HP Power over Ethernet switch and router, and each Power

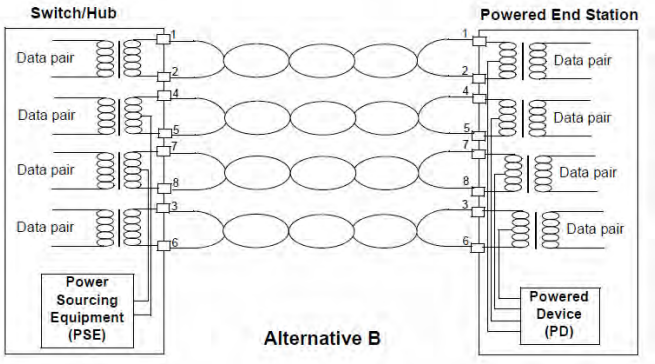
	over Ethernet switch and router made by others used in connection with HP's powered devices (access devices).[8] HP's Power over Ethernet switches and routers, and the switches and routers made by others, have multiple ports (*e.g.*, 8-ports, 24-ports) and can switch data between ports, providing switching functionality. Non-limiting examples of such switches and routers are listed in the main body of these Infringement Contentions and are identified as Accused Instrumentalities for various Defendants under the heading: "*power sourcing equipment (data nodes)*." *Doctrine of equivalents*: To the extent that the contentions described above do not constitute literal infringement of this element, they constitute infringement under the doctrine of equivalents because any differences between the claim element and the features of the Accused Instrumentalities are insubstantial. To the extent that the identified "data nodes" (Ethernet switches and routers) are not literally "adapted for data switching," they handle and switch data in a way that is equivalent to "data switching" because, for example, they (a) perform the same function—provide switching functionally, (b) in substantially the same way—*e.g.*, via multiple ports, (c) to obtain substantially the same result—switching data between ports and connected devices.

[8] A router that transmits Ethernet packets or frames between Ethernet segments is an Ethernet switch (sometimes referenced as a Layer 3 switch). To the extent that such a router is not a "data node," in the context of the '930 Patent, it is equivalent to a data node because a router (a) performs the same function, (b) in substantially the same way, (c) to obtain substantially the same result.

[a-2] an access device adapted for data transmission	*Sample evidence (HP statements, depictions, and other documentation) includes*: • "IEEE 802.3af Power over Ethernet (PoE): provides up to 15.4 W per port to IEEE 802.3af-compliant PoE-powered devices such as IP phones, wireless access points, and security cameras." (HP A3600 EI Switch Series QuickSpecs) [N205169]; • "They can supply power over a twisted-pair cable to power devices such as telephones, wireless access points, IP Gateways, and audio and video remote monitoring." (HP ProCurve Power over Ethernet (PoE/PoE+) Planning and Implementation Guide) [N237047]; • "Powered Device. A device that receives power through a direct connection to a 10/100 Base-TX PoE RJ-45 port on the switch. Examples of PDs include Voice-over-IP (VoIP) telephones, wireless access points, and remote video cameras." (Power Over Ethernet (PoE) Operation for the Series 2600-PWR Switches) [N238139]; • "10/100 Ethernet interface — provides a connection to the network that eliminates the network as a bottleneck." (HPA-802.11a/b/g Access Point Series Features) [N206599]; • "Gigabit Ethernet support" (HP 350x IP Phone Series Overview) [N238666]; • "HP offers intelligent single, dual and tri radio Access Points designed to provide reliable, easy-to-use wireless connectivity across the network." (HP MSM-802.11a/b/g Access Point Series Overview) [N238821]. • "Powered devices (PD) include any Ethernet device capable

	of receiving power through a data port such as IP telephones, IP cameras, PDAs and tablet PCs." (HP ProCurv Switch 2610 Series—PoE Support and Compatibility) [N290385]. *802.3af, 802.3at, and 802.3-2008 Standards statements and depictions include*:  Endpoint PSE, Alternative A (IEEE 802.3af Standard Figure 33-4) [N12558]; (IEEE802.3-2008 Standard Figure 33-4) [N236613]; (IEEE 802.3at Standard Figure 33-4) [N151877];





(IEEE 802.3at Standard Figure 33-5) [N151878].

- "A PD designed to the standard, and within its range of available power, can obtain both power and data for operation through the MDI and therefore need no additional connections." (IEEE 802.3af Standard 33.1.1) [N12555]; (IEEE 802.3-2008 Standard 33.1.1) [N236610]; (IEEE 802.3at Standard 33.1.1.) [N151872].

The HP power sourcing equipment (data nodes) are specifically designed for use with IEEE 802.3af and IEEE 802.3at compliant powered devices (access devices). The HP powered devices (access devices) are 802.3af and 802.3at compliant powered devices (access devices). Under the 802.3af and 802.3at Standards, the Powered End Station – powered device (PD) is an access device adapted for data transmission.

	Identification: The "access device adapted for data transmission" is each of the powered devices (access devices) made by HP or others, that are used in conjunction with the power sourcing equipment (data nodes, addressed above) made by HP or others, that can receive and transmit data. Non-limiting examples of such access devices include (a) phones (including IP phones), (b) wireless access points, (c) cameras (*e.g.*, security cameras), (d) magnetic card readers, and (e) video kiosks. Non-limiting examples of such access devices are also listed in the main body of these Infringement Contentions and are identified as Accused Instrumentalities for various Defendants under the headings: "*powered devices (access devices)*."
[a-3] at least one data signaling pair connected between the data node and the access device and arranged to transmit data therebetween	*Sample evidence (HP statements, depictions, and other documentation) includes*: • "Auto-MDIX: automatically adjusts for straight-through or crossover cables on all 10/100 and 10/100/1000 ports" (HP A3600 EI Switch Series Data sheet) [N205148]; • "The PoE Ethernet switches are installed to supply power over the twisted pair LAN cables to run phones or other appliances as required." (HP ProCurve Power over Ethernet (PoE/PoE+) Planning and Implementation Guide) [N237045]; (HP Power over Ethernet (PoE) for sl and yl Products – Planning and Implementation guide) [N238350]; • "HP ProCurve Networking switches, as a PSE, supply PoE power over the 'data pair' or, pins 1 and 2, and the pair on pins 3 and 6." (HP ProCurve Power over Ethernet

(PoE/PoE+) Planning and Implementation Guide) [N237046];

- "A standard CAT5 Ethernet cable has four twisted pairs, but only two of these pairs are used for l0Base-T and 100Base-TX data and all four are used for 1000Base-T data." (HP Power over Ethernet (PoE) for zl and yl Products – Planning and Implementation guide) [N238351];
- "They can supply power over a twisted-pair cable to power devices such as telephones, wireless access points, IP Gateways, and audio and video remote monitoring." (HP ProCurve Power over Ethernet (PoE/PoE+) Planning and Implementation Guide) [N237047];
- "The PoE Ethernet switches are installed to supply power over the twisted pair LAN cables to run phones or other appliances as required." (HP ProCurve Power over Ethernet (PoE/PoE+) Planning and Implementation Guide) [N238402];

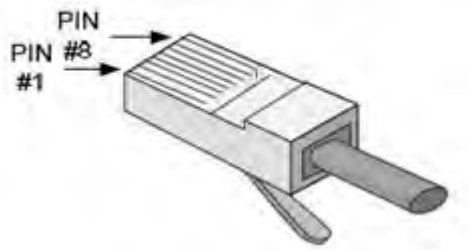
Figure 21 Connecting an Ethernet cable to a LAN port

- (A-MSR900 Router Series Installation Guide) [N239257];
- "The end node devices are connected to the edge switch by straight-through or crossover twisted-pair cables. Either cable type can be used because of the 'IEEE Auto MDI/MDI-

X' features on the Switch." (E6400 cl Series Installation Guide) [N239316].

- "Step1 Connect one end of the Ethernet cable to the electrical Ethernet port on the device and the other end to an Ethernet interface of the peer device." (A3000G Switch Series Installation Guide) [N238887];
- "The 10/100/1000M electrical Ethernet ports of the WX3000 series work with Category-5 twisted pair cables with RJ-45 connectors, as shown in Figure 1-10." (A3000G Switch Series Installation Guide) [N238859];

Figure 1-10 RJ-45 connector



- (A3000G Switch Series Installation Guide) [N238859];
- "Connect the access point to an access controller/unified switch directly or indirectly through an intermediate Layer 2 or Layer 3 network. In either case, use a Category 5e cable for the connection." (A802.11a/b/g Access Point Installation Guide) [N239403];
- "Use an Ethernet cable to connect the IP Phone to the LAN." (350x IP Phone Quick Start Guide) [N239413].

802.3af, 802.3at, and 802.3-2008 Standards statements and depictions include:

Table 33–1—PSE pinout alternatives

Conductor	Alternative A (MDI-X)	Alternative A (MDI)	Alternative B (All)
1	Negative V_{Port}	Positive V_{Port}	
2	Negative V_{Port}	Positive V_{Port}	
3	Positive V_{Port}	Negative V_{Port}	
4			Positive V_{Port}
5			Positive V_{Port}
6	Positive V_{Port}	Negative V_{Port}	
7			Negative V_{Port}
8			Negative V_{Port}

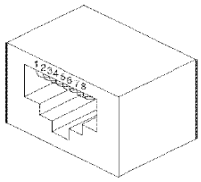
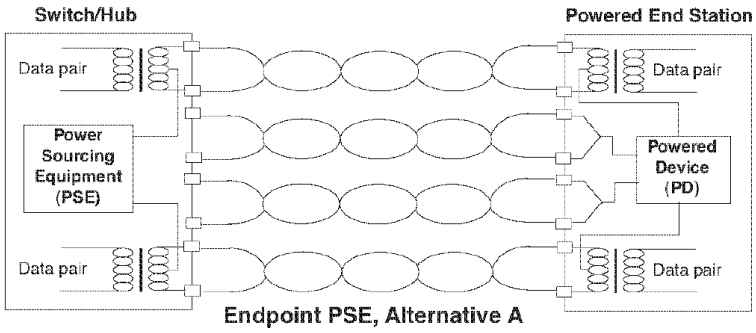
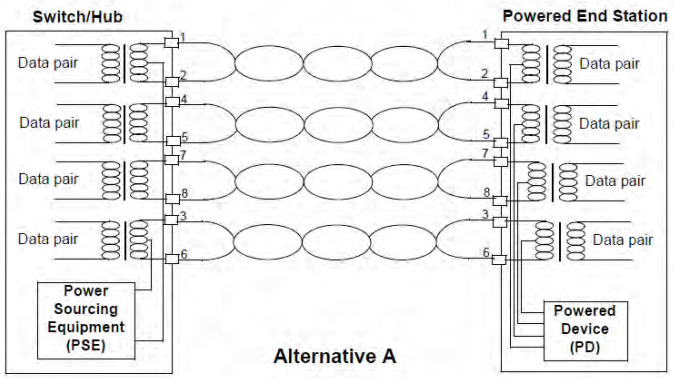


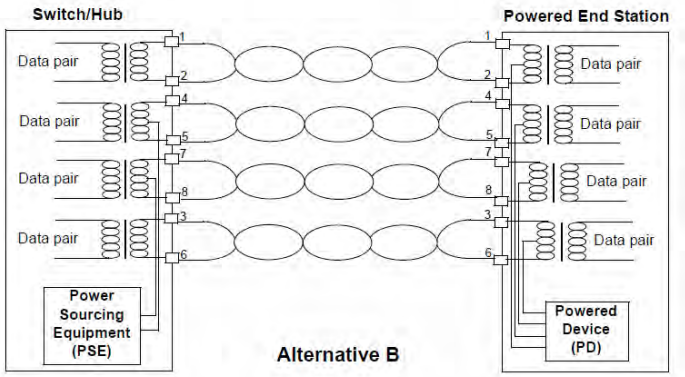
Figure 33–5—PD and PSE eight-pin modular jack

(IEEE 802.3af Standard Table 33-1 and Figure 33-5) [N12559]; (IEEE 802.3-2008 Standard Table 33-1 and Figure 33-5) [N236614]; (IEEE 802.3at Standard Table 33-2 and Figure 33-8) [N151881];



(IEEE 802.3af Standard Figure 33-4) [N12558];





(IEEE 802.3at Standard Figure 33-5) [N151878];

- "PI pin assignments. A PSE device may provide power via one of two valid four-wire connections. In each four-wire connection, the two conductors associated with a pair each carry the same nominal current in both magnitude and polarity. For the purposes of data transfer, the type of PSE data port is relevant to the far-end PD and in some cases to the cabling system between them." (IEEE 802.3af Standard 33.2.2) [N12559]; (IEEE 802.3-2008 Standard 33.2.2) [N236614]; (IEEE 802.3at Standard 33.2.3) [N151881].

HP's power sourcing equipment (data nodes) are designed to be connected to IEEE 802.3af and IEEE 802.3at compliant access devices via a cable with at least one data signaling pair (*e.g.*, a

	Category 5 cable). The data signaling pair is defined as the twisted pair medium that connects the medium dependent interface (MDI) on the PSE to the MDI on the PD. As the 802.3af Standard was designed for 10Base-T, 100Base-TX, and 1000Base-T, this is 2 pair or greater Category 3, 4, 5, 5e or better cable designed and installed for data transmission. Under the 802.3af and 802.3at Standards, the interface of the data signaling pair is referred to as the twisted pair medium dependent interface that connects to the line transformer data pairs as shown in Figure 33-4 of the standards. [N12558]. Table 33-1 details the particular pins that may be used by the data pairs. [N12559]. *Identification*: The "at least one data signaling pair connected between the data node and the access device and arranged to transmit data therebetween" is a pair of wires in an Ethernet cable arranged to connect and transmit data and power between data nodes (addressed above) and access devices (addressed above). A non-limiting example of such a data signaling pair is a pair of twisted wires found in a Category 5 (CAT-5) Ethernet cable used to transmit data and power. In this non-limiting example, a data signaling pair can be the pair of wires that connect pins 1 and 2 of the RJ-45 connector of the power sourcing equipment (data node) to the corresponding pins of the powered device (access device).
[a-4] a main power source connected to supply power to the data node, and	*Sample evidence (HP statements, depictions, and other documentation) includes*: • "PoE power is the power supplied by the internal power supply. It is dependent on the type and quantity of power

supplies and may be supplemented with the use of an external power supply (EPS)." (HP A3600 EI Switch Series Data sheet) [N205152];

- "Power Supply: HP A-RPS800 Redundant Power System (JD183A) HP A-RPS1600 Redundant Power System (JG136A) HP A-RPS1600 1600W AC Power Supply (JG137A)" (HP A3600 EI Switch Series Data sheet) [N205157];

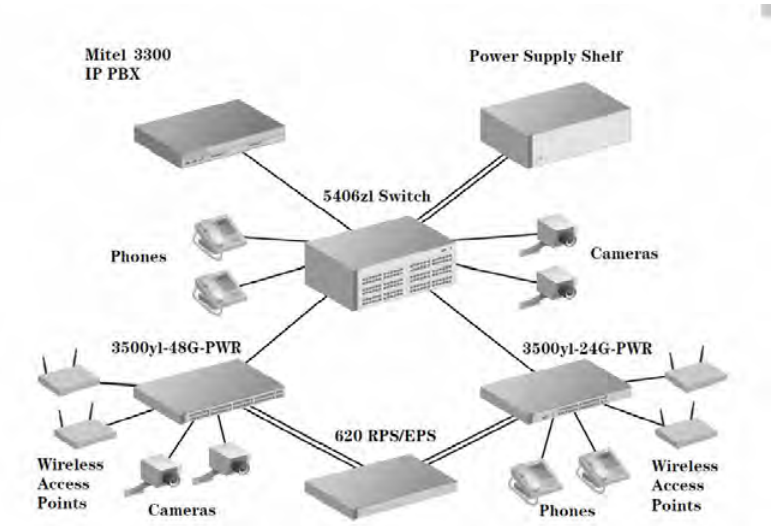


Figure 1-1. Example of a Typical Implementation

- (HP ProCurve Power over Ethernet (PoE/PoE+) Planning and Implementation Guide) [N237045];
- "Use the J9306A zl power supply for systems providing PoE and PoE+ power." (HP ProCurve Power over Ethernet (PoE/PoE+) Planning and Implementation Guide) [N237062];
- "The J9306A zl power supply provides PoE/PoE+ power at 54 volts (300 watts at 110 volts and 900 watts at 220 volts)." (HP ProCurve Power over Ethernet (PoE/PoE+) Planning and Implementation Guide) [N237062];

	• "The internal power supply can offer up to 370 W, so the device supports 24 ports for PoE at the same time." (HP A300G Wireless Switch Series Data sheet) [N205069]; • "When an RPS external power supply is adopted, the device supports 24 ports for PoE+ at the same time." (HP A300G Wireless Switch Series Data sheet) [N205069]; • "Power Inputs 100 W (without external PoE device); AC: 470 W; DC (with external RPS): 700 W" (HP A300G Wireless Switch Series) [N205077]; • "The internal power supply in these switches provides both the 12V (RPS) and 50V (EPS) circuits." (HP ProCurve Power over Ethernet (PoE/PoE+) Planning and Implementation Guide) [N237052]; • "Source of Power – Internal PoE Power Supply." HP ProCurve Power over Ethernet (PoE/PoE+) (Planning and Implementation Guide) [N237100]; • "Power Supply J8712A" (HP ProCurve Power over Ethernet (PoE/PoE+) Planning and Implementation Guide) [N237162];

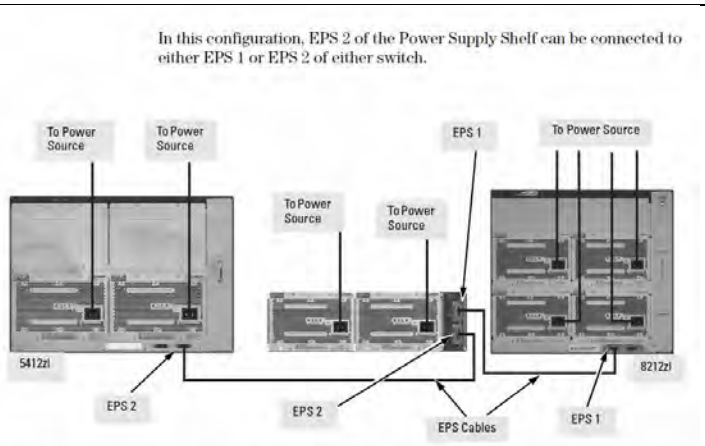
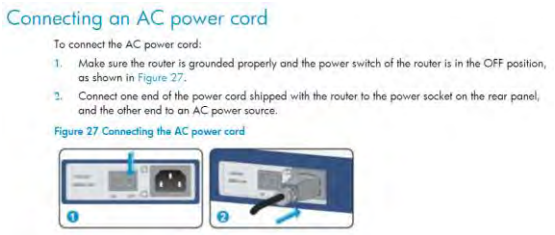


Figure 10-22.Connecting the EPS to two switches, one 5412zl and one 8212zl

- (HP ProCurve Power over Ethernet (PoE/PoE+) Planning and Implementation Guide) [N237183];
- "There are two types of power supplied by the Series 5400zl switch power supplies • 12V power or system power • 50V power or PoE power. The 12V system power is used for the backplane and is what operates the internal components of the switch. The 50V PoE power is used to power the PoE devices connected to the modules." (HP Power over Ethernet (PoE) for zl and yl Products – Planning and Implementation guide) [N238354];



- (A-MSR30 Series Installation Guide) [N239185].

802.3af, 802.3at, and 802.3-2008 Standards statements and depictions include:

- "PSE, as the name implies, is the equipment that provides the power to a single link section." (IEEE 802.3af Standard

	33.2) [N12557]; (IEEE 802.3-2008 Standard 33.2) [N236612]; • "The PSE is the portion of the end station or midspan equipment that provides the power to a single PD." (IEEE 802.3at Standard) [N151875]. HP's IEEE 802.3af and IEEE 802.3at compliant power sourcing equipment, which needs power to function, is powered by a main power source. The IEEE 802.3af and IEEE 802.3at Standards do not specify particular requirements for the main power source, but such a main power source is necessary for the power sourcing equipment (PSE) to function. *Identification*: HP's power sourcing equipment (data nodes), and the power sourcing equipment (data nodes) made by others used in connection with HP's powered devices (access devices), have access to "a main power source connected to supply power to the data node." There are three theories under which the "main power source" is connected, via electrical connections, wiring, or cables, to supply certain power requirements to at least certain electrical components the data nodes: • theory 1: The "main power source" that supplies power to the power sourcing equipment (data nodes, addressed above) is a DC power supply[9] that provides DC power to components of the data node. A non-limiting example of such a DC power supply is a power supply that provides 12V and 48V outputs to power components of

[9] A power supply is a collection of electronic circuitry or components used to convert voltages and currents.

	the data node. • theory 2: The "main power source" is a combination of power supplies, arranged in series or parallel, that provide DC power to components of the data node. As a non-limiting example, the combination of power supplies can consist of (1) a power supply that provides a 12V output to power some components of the data node, and (2) a power supply that provides a 48V output to power other components of the data node. The main power source can be, or be connected to receive power from, a power rack. • theory 3: The "main power source" is an AC power source provided via a power cord that is adapted to connect an AC outlet to the power sourcing equipment (data nodes). The connection can be established by, for example, plugging one end of the power cord into a dedicated grounded AC outlet or power strip and the other end into the AC power socket of the data node.[10] *Doctrine of equivalents*: To the extent that the contentions described above do not constitute literal infringement of this element, they constitute infringement under the doctrine of equivalents because any differences between the claim element and the features of the Accused Instrumentalities are insubstantial.

[10] For example, switches and routers (data nodes) are often sold with a power cord adapted for connection to an AC outlet, either directly or using an external power supply, connected to supply main power to the switches and routers (and to semiconductor logic circuits within the switch).

	• doctrine of equivalents for theory 3: To the extent that an AC source of power is not literally a "main power source," an AC source of power, in the context of the '930 Patent, is equivalent to a main power source (if a main power source is limited to a DC source of power) because an AC and DC source of power are interchangeable (they can be converted back and forth) and perform (a) substantially the same function, (b) in substantially the same way, (c) to obtain substantially the same result.[11] Specifically, whether the power source is originally DC or AC (that is converted into DC) is immaterial in the context of the invention.[12] • doctrine of equivalents for theory 2: To the extent that a combination of power supplies (*e.g.*, a combination of power supplies in serial or in parallel) is not literally a main power source, such a combination would constitute a main power source under the doctrine of equivalents because such a combination performs (a) substantially the same function, (b) in substantially the same way, (c) to obtain substantially the same result.[13] Specifically, whether the

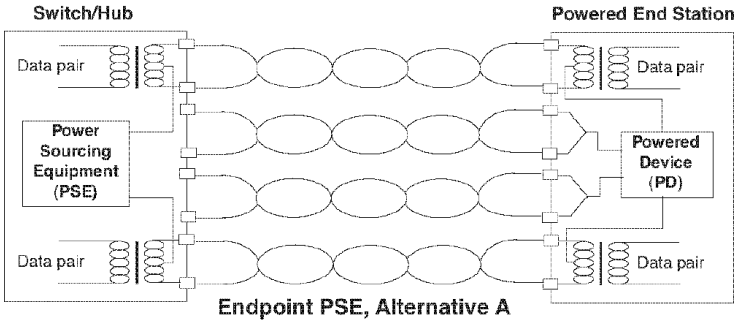
[11] From a technical perspective, there is really no such thing as "AC power" or "DC power." Power is measured in watts. AC and DC refer to the current flow and are related to the waveform of the current through a load (*i.e.*, the voltage waveform applied to the load).

[12] Both an AC power source (*e.g.*, AC outlet or power cord) and a DC power source are sources of power that are arranged to supply operating power to the power sourcing equipment (data nodes) and the low level current by providing power that meets, or can be converted to meet, the power requirements (*e.g.*, voltages) that can be used by the internal circuitry of the power sourcing equipment (data nodes) to perform the appropriate functions.

[13] A single power supply or combination of power supplies provides the source of power to the electrical circuitry of the power sourcing equipment (data node) and the low level current by providing a source of power that meets, or can be converted to meet, the power requirements

	power supply consists of a single power supply or multiple power supplies, in series, in parallel, or a combination of both, is immaterial in the context of the invention.
[a-5] a secondary power source arranged to supply power from the data node via said data signaling pair to the access device,	*Sample evidence (HP statements, depictions, and other documentation) includes*: • "PoE power is the power supplied by the internal power supply. It is dependent on the type and quantity of power supplies and may be supplemented with the use of an external power supply (EPS)." (HP A3600 EI Switch Series Data sheet) [N205152]; • "Power Supply: HP A-RPS800 Redundant Power System (JD183A) HP A-RPS1600 Redundant Power System (JG136A) HP A-RPS1600 1600W AC Power Supply (JG137A)" (HP A3600 EI Switch Series Data sheet) [N205157]; • "HP ProCurve Networking switches, as a PSE, supply PoE power over the 'data pair' or, pins 1 and 2, and the pair on pins 3 and 6." (HP ProCurve Power over Ethernet (PoE/PoE+) Planning and Implementation Guide) [N237046]; • *See* element [a-4]. *802.3af, 802.3at, and 802.3-2008 Standards statements and depictions include*:

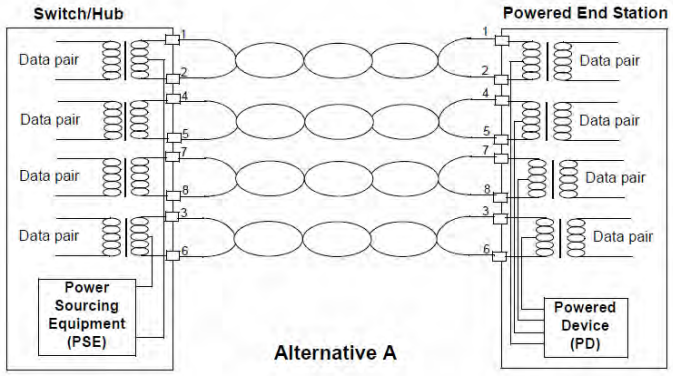
(*e.g.*, voltages) of at least some internal circuitry of the power sourcing equipment (data nodes) to perform their appropriate functions.

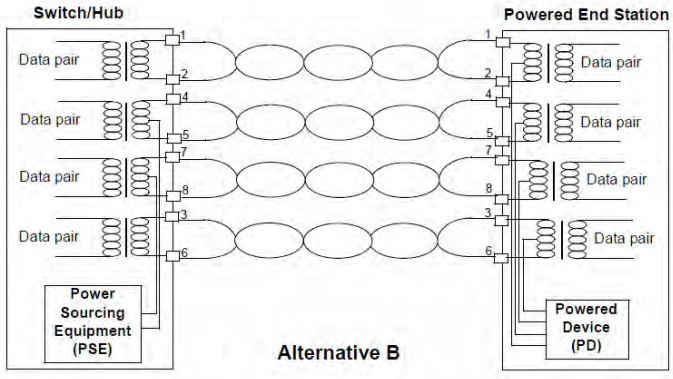


(IEEE 802.3af Standard Figure 33-4) [N12558];

(IEEE 802.3-2008 Standard Figure 33-4) [N236613];

(IEEE 802.3at Standard Figure 33-4) [N151877];





(IEEE 802.3at Standard Figure 33-5) [N151878];

- "DTE powering is intended to provide a 10BASE-T, 100BASE-TX, or 1000BASE –T devices with a single interface to both the data it requires and the power to process this data. This clause specifies the following a) A

	power source to add power to the 100 Ω balanced cabling system." (IEEE 802.3-2008 Standard 33.1) [N236610]; (IEEE 802.at Standard 33.1.1) [N151872]. • "33.2.8.4 Maximum output current in normal powering mode at PSE min output voltage. For V_{Port} > 44V, the minimum value for I_{Port_max} in Table 33–5 shall be 15.4W/VPort. The current I_{Port_max} ensures 15.4W min output power." (IEEE 802.3af Standard 33.2.8.4) [N12571]; (IEEE 802.3-2008 Standard 33.2.8.4) [N236626]; • "33.2.8.1 Output voltage. The specification for V_{Port} in Table 33–5 shall include line and temperature variations. The voltage potential shall be measured between any conductor of one power pair and any conductor of the other power pair." (IEEE 802.3af Standard 33.2.8.1) [N12571]; (IEEE 802.3-2008 Standard 33.2.8.1) [N236626];

Table 33–11—PSE output PI electrical requirements for all PD classes, unless otherwise specified

Item	Parameter	Symbol	Unit	Min	Max	PSE Type	Additional information
1	Output voltage in the POWER_ON state	V_{Port_PSE}	V	44.0	57.0	1	See 33.2.7.1.
				50.0	57.0	2	
2	Voltage transient below V_{Port_PSE} min	K_{Tran_lo}	%		7.6	2	See 33.2.7.2.
3	Power feeding ripple and noise:						
	f < 500 Hz		V_{pp}		0.500	1, 2	See 33.2.7.3.
	500 Hz to 150 kHz				0.200		
	150 kHz to 500 kHz				0.150		
	500 kHz to 1 MHz				0.100		
4	Continuous output current capability in POWER_ON state	I_{Con}	A	P_{Class} / V_{Port_PSE}		1, 2	See 33.2.7.4.
5	Output current in POWER_UP state	I_{Inrush}	A	0.400	See info	1, 2	See 33.2.7.5. Max value defined by Figure 33–13.
6	Inrush time	T_{Inrush}	s	0.050	0.075	1, 2	See 33.2.7.5
7	Overload current detection range	I_{CUT}	A	P_{Class} V_{Port_PSE}	I_{LIM}	1,2	Optional limit; see 33.2.7.6, Table 33–7.
8	Overload time limit	T_{CUT}	s	0.050	0.075	1, 2	See 33.2.7.7
9	Output current – at short circuit condition	I_{LIM}	A	0.400	See info	1	See 33.2.7.7. Max value defined by Figure 33–14.
				1.14 × I_{Cable}		2	
10	Short circuit time limit	T_{LIM}	s	0.050	See info	1	See 33.2.7.7.
				0.010		2	
11	Continuous output power capability in POWER_ON state	P_{Con}	W	P_{Class}		1, 2	See 33.2.7.10, Table 33–7.
12	PSE Type power minimum	P_{Type}	W	I_{Cable} × (V_{Port_PSE} min)		1, 2	See 33.1.4.
13	Power turn on time	T_{pon}	s		0.400	1, 2	See 33.2.7.12.

Table 33–11—PSE output PI electrical requirements for all PD classes, unless otherwise specified *(continued)*

Item	Parameter	Symbol	Unit	Min	Max	PSE Type	Additional information
14	Turn on rise time	T_{Rise}	µs	15.0		1, 2	From 10 % to 90 % of the voltage difference at the PI in POWER_ON state from the beginning of POWER_UP.
15	Turn off time	T_{Off}	s		0.500	1, 2	See 33.2.7.8.
16	Turn off voltage	V_{Off}	V		2.80	1, 2	See 33.2.7.9.
17	DC MPS current	I_{Hold}	A	0.005	0.010	1, 2	See 33.2.9.1.2.
18	PD Maintain Power Signature dropout time limit	T_{MPDO}	s	0.300	0.400	1, 2	See 33.2.9.
19	PD Maintain Power Signature time for validity	T_{MPS}	s	0.060		1, 2	See 33.2.9.
20	Current unbalance	I_{unb}	A		3 % × I_{Cable}	1	See 33.2.7.11, 33.4.8. NOTE—For practical implementations, it is recommended that Type 1 PSEs support Type 2 I_{unb} requirements.
					3 % × I_{Peak}	2	
21	Alternative B detection backoff time	T_{dbo}	s	2.00		1, 2	
22	Output capacitance during detection state	C_{out}	µF		0.520	1, 2	
23	Detection timing	T_{det}	s		0.500	1, 2	Time to complete detection of a PD.
24	Error delay timing	T_{ed}	s	0.750		1, 2	Delay before PSE may attempt subsequent powering after power removal because of error condition.

(IEEE 802.3at Standard Table 33-11) [N151898-99];

- "When the PSE provides power to the PI, it shall conform with Table 33-11." (IEEE 802.3at at 33.2.7) [N151898].

	HP's IEEE 802.3af and IEEE 802.at compliant power sourcing equipment have a source of secondary power which provides operating power from the Switch/Hub (the Power Sourcing Equipment (PSE)) to the Powered End Station (Powered Device (PD)). *Identification*: HP's power sourcing equipment (data nodes, addressed above), and the power sourcing equipment (data nodes) made by others used in connection with HP's powered devices (access devices), use "a secondary power source arranged to supply power from the data node via said data signaling pair to the access device." When a properly configured powered device (access device, addressed above) is detected, the secondary power source supplies power (for example (non-limiting), 48 Volts DC for an access device that requires such a power load) from the power sourcing equipment (data node, addressed above) through the data signaling pairs (addressed above, *e.g.*, Ethernet Category 5 cables) to the powered device (access device) to supply operating power to the powered device (access device) under the following two theories: • theory 1: the power sourcing equipment (data nodes) incorporate a control valve or switch (which may be part of an integrated circuit) that controls the application of power to the access device derived from the main power source (addressed above). The control valve or switch (for example (non-limiting), a MOSFET switch or other transistor) is electrically located between the main power source and the access

	device, and is a downstream or separate driving point from the main power source, for the function of providing operating power to the powered device (access device). • theory 2: The secondary power source is the same source of power as the main power source. Under this theory, the secondary power source is the source of secondary power that provides power for the secondary function of supplying power from the data node via said data signaling pair to the powered device (access device) which occurs, under certain circumstances, after the main power source performs the main or primary functions of (i) providing power to the power sourcing equipment (data nodes), and (ii) delivering the low level current to the powered device (access devices). The power sourcing equipment (data nodes) use a secondary power source (source of secondary power) which can be the same as the main power source under the three theories for main power source set forth above (*e.g.*, (i) a power supply, (ii) a multiple power supply configuration, or (iii) the AC outlet or power strip connected to the power sourcing equipment (data node) using a power cord). *Doctrine of equivalents*: To the extent that the contentions described above do not constitute literal infringement of this element, they constitute infringement under the doctrine of equivalents because any differences between the claim element

	and the features of the Accused Instrumentalities are insubstantial. To the extent that the main power source and the secondary power source are required to be separate, a power source that is arranged to supply power from the data node via said data signaling pair to the access device, that is the same source of power as the main power source, is equivalent to a separate main and secondary power source because, for example, it (a) performs the same function—supplying power from the power sourcing equipment (data node) to the powered device (access device), (b) in substantially the same way—via the data signaling pair, (c) to obtain substantially the same result—provide operating power to power the powered device (access device).
[b] delivering a low level current from said main power source to the access device over said data signaling pair,	*Sample evidence (HP statements, depictions, and other documentation) includes*: • "A discovery process, run from the PSE, examines the Ethernet cables, looking for devices that comply with the specification. It does this by applying a small current-limited voltage to the cable and checks for the presence of a 25k ohm resistor in the remote device. Only if the resistor is present, will the full wattage be applied..." (HP ProCurve Power over Ethernet (PoE/PoE+) Planning and Implementation Guide) [N237047]; • "An obvious requirement of the specification is to prevent damage to existing Ethernet equipment. A discovery process, run from the PSE, examines the Ethernet cables, looking for devices that comply with the specification. It does this by applying a small current-

	limited voltage to the cable and checks for the presence of a 25k ohm resistor in the remote device. Only if the resistor is present, will the full wattage be applied, but this is still current-limited to prevent damage to cables and equipment in fault conditions." (HP Power over Ethernet (PoE/PoE+) Planning and Implementation Guide) [N289915]. • "Under the specification, PSEs apply a slight voltage on the power-delivery pairs. If there is a valid PD on the cable, it will present a specific resistance and a capacitance. (HP ProCurve Switch 2610 Series—PoE Support and Compatibility) [N290385]. *802.3af, 802.3at, and 802.3-2008 Standards statements and depictions include:* • "The PSE probes the link section in order to detect a valid PD detection signature." (IEEE 802.3af Standard 33.2.6) [N12567]; (IEEE 802.3-2008 Standard 33.2.6) [N236622]; • "The PSE shall detect the PD by probing via the PSE PI." (IEEE 802.3af Standard 33.2.5) [N12566]; (IEEE 802.3-2008 Standard 33.2.5 [N236621]; • "The detection voltage V_{detect} shall be within the V_{Valid} voltage range at the PSE PI as specified in Table 33–2 with a valid PD detection signature connected." (IEEE 802.3af Standard 33.2.5.1) [N12567]; (IEEE 802.3-2008 Standard 33.2.5.1) [N236622];

Item	Parameter	Symbol	Unit	Min	Max	Additional information
1	Open circuit voltage	V_{oc}	V		30	In detection mode only
2	Short circuit current	I_{sc}	mA		5	In detection mode only
3	Valid test voltage	V_{valid}	V	2.8	10	

Table 33–2—PSE PI detection mode electrical requirements *(continued)*

Item	Parameter	Symbol	Unit	Min	Max	Additional information
4	Voltage difference between test points	ΔV_{test}	V	1		
5	Time between any two test points	T_{BP}	ms	2		This timing implies a 500Hz maximum probing frequency.
6	Slew rate	V_{slew}	V/μs		0.1	
7	Accept signature resistance	R_{good}	KΩ	19	26.5	
8	Reject signature resistance	R_{bad}	KΩ	15	33	
9	Open circuit resistance	R_{open}	KΩ	500		
10	Accept signature capacitance	C_{good}	nF		150	
11	Reject signature capacitance	C_{bad}	μF	10		
12	Signature offset voltage tolerance	V_{os}	V	0	2.0	See Annex 33A for examples of valid signatures.
13	Signature offset current tolerance	I_{os}	μA	0	12	

(IEEE 802.3af Standard Table 33-2) [N12566-67];

(IEEE 802.3-2008 Standard Table 33-2) [N236621-22];

Table 33–4—PSE PI detection state electrical requirements

Item	Parameter	Symbol	Unit	Min	Max	Additional information
1	Open circuit voltage	V_{oc}	V		30.0	In detection state only
2	Short circuit current	I_{sc}	A		0.005	In detection state only
3	Valid test voltage	V_{valid}	V	2.80	10.0	—
4	Voltage difference between test points	ΔV_{test}	V	1.00		—
5	Slew rate	V_{slew}	V/μs		0.100	—

(IEEE 802.3at Standard Table 33-4) [N151891];

- "The PSE probes the link section in order to detect a valid PD detection signature. The PSE PI is connected to a PD through a link segment." (IEEE 802.3at Standard 33.2.) [N151890];
- "The detection voltage at the PSE PI shall be within the V_{valid} voltage range (as specified in Table 33-4) with a

	valid PD detection signature connected (as specified in Table 33-14)." (IEEE 802.3at Standard 33.2.5.2) [N151892]; • "The open circuit voltage and short circuit current shall meet the specifications in Table 33–2." (IEEE 802.3af Standard 33.2.5) [N236621]. HP's IEEE 802.3af and IEEE 802.3at compliant power sourcing equipment contains circuitry that delivers a low level current (detection probe) to the access device over the data signaling pairs via a PD detection signature. *Identification*: The low level current delivered from the main power source (addressed above) to the access device (powered device, addressed above) over the data signaling pair (addressed above) is the detection current (for example (non-limiting), in the range of 10 to 500 micro amps), that is used (as opposed to a data signal) to determine whether the access device (powered device) can receive operating power. *Doctrine of equivalents*: To the extent that the contentions described above do not constitute literal infringement of this element, they constitute infringement under the doctrine of equivalents under the following three theories because any differences between the claim element and the features of the Accused Instrumentalities are insubstantial. • theory 1: The detection current delivered from the power sourcing equipment (data node) is equivalent to a low level current because, for example, it (a) is power current (as

	opposed to a data signal) that performs the same function—creates a response from a powered device (access device), (b) in substantially the same way—over the data signaling pair, (c) to obtain substantially the same result—it is used to determine whether the power sourcing equipment (data node) should deliver operating power to the powered device (access device) over the data signaling pair. • theory 2: To the extent that the power sourcing equipment apply a voltage and subsequently measure a signature current, applying (or delivering) a low level voltage and measuring a signature current is equivalent to applying (or delivering) a low level current and measuring a signature voltage because (1) from an electrical perspective, delivering a current and measuring a voltage is equivalent to delivering a voltage and measuring a current, and (2) it (a) performs the same function—creates a response from a powered device (access device), (b) in substantially the same way—*e.g.*, over the data signaling pair, (c) to obtain substantially the same result—*e.g.*, it is used to determine whether the power sourcing equipment (data node) should deliver operating power to the powered device (access device) over the data signaling pair. • theory 3: To the extent that the power sourcing equipment apply multiple (*e.g.*, two or more) detection currents / voltages and subsequently sense (element [c]) and control (element [d]) based on the resulting currents / voltages on the data signaling pair, using multiple detection currents / voltages is equivalent to applying a single current / voltage

	because, for example, it (a) performs the same function—*e.g.*, creates a response from a powered device (access device), (b) in substantially the same way—*e.g.*, over the data signaling pair, (c) to obtain substantially the same result—*e.g.*, it determines whether the power sourcing equipment (data node) should deliver operating power to the powered device (access device) over the data signaling pair. • The doctrine of equivalents applies to any one of the three theories individually or any combination of two or three theories.
[c] sensing a voltage level on the data signaling pair in response to the low level current	*Sample evidence (HP statements, depictions, and other documentation) includes*: • "A discovery process, run from the PSE, examines the Ethernet cables, looking for devices that comply with the specification. It does this by applying a small current-limited voltage to the cable and checks for the presence of a 25k ohm resistor in the remote device. Only if the resistor is present, will the full wattage be applied..." (HP ProCurve Power over Ethernet (PoE/PoE+) Planning and Implementation Guide) [N237047]. *802.3af, 802.3at, and 802.3-2008 Standards statements and depictions include:*

Item	Parameter	Symbol	Unit	Min	Max	Additional information
1	Open circuit voltage	V_{oc}	V		30	In detection mode only
2	Short circuit current	I_{sc}	mA		5	In detection mode only
3	Valid test voltage	V_{valid}	V	2.8	10	

CSMA/CD IEEE Std 802.3af-2003

Table 33–2—PSE PI detection mode electrical requirements *(continued)*

Item	Parameter	Symbol	Unit	Min	Max	Additional information
4	Voltage difference between test points	ΔV_{test}	V	1		
5	Time between any two test points	T_{BP}	ms	2		This timing implies a 500Hz maximum probing frequency.
6	Slew rate	V_{slew}	V/µs		0.1	
7	Accept signature resistance	R_{good}	KΩ	19	26.5	
8	Reject signature resistance	R_{bad}	KΩ	15	33	
9	Open circuit resistance	R_{open}	KΩ	500		
10	Accept signature capacitance	C_{good}	nF		150	
11	Reject signature capacitance	C_{bad}	µF	10		
12	Signature offset voltage tolerance	V_{os}	V	0	2.0	See Annex 33A for examples of valid signatures.
13	Signature offset current tolerance	I_{os}	µA	0	12	

(IEEE 802.3af Standard Table 33-2) [N12566-67];

(IEEE 802.3-2008 Standard Table 33-2) [N236621-22];

- "33.2.5.1 Detection probe requirements. The detection voltage V_{detect} shall be within the V_{valid} voltage range at the PSE PI as specified in Table 33-2 with a valid PD detection signature connected. The PSE shall make at least two measurements with V_{detect} values that create at least a ΔV_{test} difference as specified in Table 33-2 between the two measurements with a valid PD detection signature connected." (IEEE 802.3af Standard 33.5.1) [N12567]; (IEEE 802.3-2008 Standard 33.2.5.1) [N236622];

-

Table 33–5—Valid PD detection signature electrical characteristics

Item	Parameter	Symbol	Unit	Min	Max	Additional information
1	Accept signature resistance	R_{good}	kΩ	19.0	26.5	—
2	Accept signature capacitance	C_{good}	µF		0.150	—
3	Signature offset voltage tolerance	V_{os}	V	0	2.00	—
4	Signature offset current tolerance	I_{os}	µA	0	12.0	—

(IEEE 802.3at Standard Table 33-5) [N151892];

- "The detection voltage at the PSE PI shall be within the V_{valid} voltage range (as specified in Table 33-4) with a valid PD detection signature connected (as specified in Table 33-14). In evaluating the presence of a valid PD, the PSE shall make at least two measurements with V_{PSE} values that create at least a ΔV_{test} difference as specified in Table 33-4. An effective resistance is calculated from two voltage/current measurements made during the detection process." (IEEE 802.3at Standard 33.2.5.2) [N151892].

HP's IEEE 802.3af and 802.3at compliant power sourcing equipment contain circuitry that senses a resulting voltage (detection signature) once a powered device (access devices) has been detected on the data signaling pair.

Identification: HP's power sourcing equipment (data nodes, addressed above), and the power sourcing equipment of others used in connection with HP's powered devices (access devices), includes an integrated circuit that contains circuitry that senses a voltage level or current level on the data signaling pair (addressed above), *e.g.*, the signature of the powered device (access device), in response to the low level current (addressed above) delivered on

	(or applied to) the data signaling pair. *Doctrine of equivalents*: To the extent that the contentions described above do not constitute literal infringement of this element, they constitute infringement under the doctrine of equivalents under the following three theories because any differences between the claim element and the features of the Accused Instrumentalities are insubstantial. • theory 1: To the extent that the power sourcing equipment apply a voltage and subsequently sense a current, applying (or delivering) a low level voltage and measuring a current is equivalent to applying (or delivering) a low level current and sensing a signature voltage for the reasons set forth above because, for example, it (a) performs substantially the same function, (b) in substantially the same way (*e.g.*, using power rather than a data signal), (c) to obtain substantially the same result. • theory 2: To the extent that the power sourcing equipment apply multiple (*e.g.*, two or more) detection currents / voltages and subsequently sense (element [c]) and control (element [d]) based on the resulting currents / voltages on the data signaling pair, using multiple detection currents / voltages is equivalent to applying a single current / voltage because, for example, it (a) performs substantially the same function, (b) in substantially the same way (*e.g.*, using power rather than a data signal), (c) to obtain substantially the same result. • theory 3: To the extent that the power sourcing equipment

	does not directly sense a voltage / current level on the data signaling pair, sensing a voltage / current level across other components in the low level current circuit, for example, across a sense resistor, is electrically equivalent to sensing the voltage level / current level on the data signaling pair because, for example, it (a) performs substantially the same function, (b) in substantially the same way (*e.g.*, using power rather than a data signal), (c) to obtain substantially the same result. • The doctrine of equivalents applies to any one of the three theories individually or any combination of two or three theories.
[d] controlling power supplied by said secondary power source to said access device in response to a preselected condition of said voltage level.	*Sample evidence (HP statements, depictions, and other documentation) includes*: • "Once discovered, a different voltage is applied." (HP ProCurve Power over Ethernet (PoE/PoE+) Planning and Implementation Guide) [N237047]; • "A discovery process, run from the PSE, examines the Ethernet cables, looking for devices that comply with the specification. It does this by applying a small current-limited voltage to the cable and checks for the presence of a 25k ohm resistor in the remote device. Only if the resistor is present, will the full wattage be applied." (HP ProCurve Power over Ethernet (PoE/PoE+) Planning and Implementation Guide) [N237047]. *802.3af, 802.3at, and 802.3-2008 Standards statements and*

depictions include:

- "In an operation mode, the PSE shall not apply operating power to the PI until the PSE has successfully detected a PD requesting power" (IEEE 802.3-2008 Standard 33.2.4) [N236620];
- "33.2.5.1 Detection probe requirements. The detection voltage V_{detect} shall be within the V_{valid} voltage range at the PSE PI as specified in Table 33-2 with a valid PD detection signature connected. The PSE shall make at least two measurements with V_{detect} values that create at least a ΔV_{test} difference as specified in Table 33-2 between the two measurements with a valid PD detection signature connected." (IEEE 802.3af Standard 33.5.1) [N12567]; (IEEE 802.3-2008 Standard 33.2.5.1) [N236622];

Item	Parameter	Symbol	Unit	Min	Max	Additional information
1	Open circuit voltage	V_{oc}	V		30	In detection mode only
2	Short circuit current	I_{sc}	mA		5	In detection mode only
3	Valid test voltage	V_{valid}	V	2.8	10	

CSMA/CD IEEE Std 802.3af-2003

Table 33–2—PSE PI detection mode electrical requirements *(continued)*

Item	Parameter	Symbol	Unit	Min	Max	Additional information
4	Voltage difference between test points	ΔV_{test}	V	1		
5	Time between any two test points	T_{BP}	ms	2		This timing implies a 500Hz maximum probing frequency.
6	Slew rate	V_{slew}	V/μs		0.1	
7	Accept signature resistance	R_{good}	KΩ	19	26.5	
8	Reject signature resistance	R_{bad}	KΩ	15	33	
9	Open circuit resistance	R_{open}	KΩ	500		
10	Accept signature capacitance	C_{good}	nF		150	
11	Reject signature capacitance	C_{bad}	μF	10		
12	Signature offset voltage tolerance	V_{os}	V	0	2.0	See Annex 33A for examples of valid signatures.
13	Signature offset current tolerance	I_{os}	μA	0	12	

(IEEE 802.3af Standard Table 33-2) [N12566-67];

	(IEEE 802.3-2008 Standard Table 33-2) [N236621-22]; • "The detection voltage at the PSE PI shall be within the V_{valid} voltage range (as specified in Table 33-4) with a valid PD detection signature connected (as specified in Table 33-14). In evaluating the presence of a valid PD, the PSE shall make at least two measurements with V_{PSE} values that create at least a ΔV_{test} difference as specified in Table 33-4. An effective resistance is calculated from two voltage/current measurements made during the detection process." (IEEE 802.3at Standard 33.2.5.2) [N151892]; • "A PSE shall accept as a valid signature a link section with both of the following characteristics between the powering pairs with an offset voltage up to V_{os} max and an offset current up to I_{os} max, as specified in Table 33-5: a) Signature resistant R_{good}, and b) Parallel signature capacitance $C_{good.}$" (IEEE 802.3at Standard, 33.2.5.2) [N151892]; • "A PSE shall accept as a valid signature a link section with both of the following characteristics between the powering pairs with an offset voltage up to V_{os} max and an offset current up to I max, as specified in Table 33–2: a) Signature resistance R_{good}, and b) Parallel signature capacitance $C_{good.}$" (IEEE 802.3-2008 Standard 33.2.6.1) [N236622];

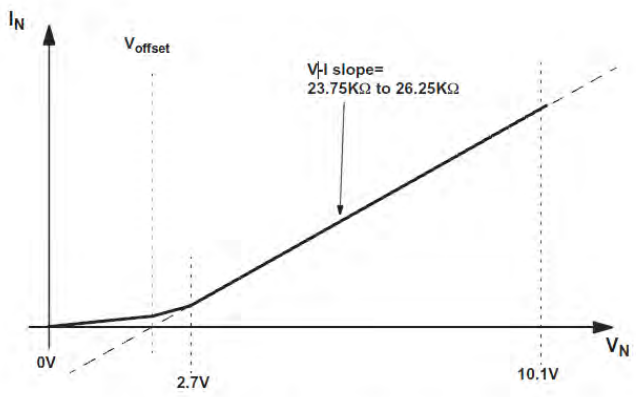


Figure 33C.20—Signature voltage offset

(IEEE 802.3af Standard 33C.20) [N12640];

(IEEE 802.3-2008 Standard 33C-20) [N236866];

- "33.2.8.4 Maximum output current in normal powering mode at PSE min output voltage. For V_{Port} > 44V, the minimum value for I_{Port_max} in Table 33–5 shall be 15.4W/V_{Port}. The current I_{Port_max} ensures 15.4W min output power." (IEEE 802.3af Standard 33.2.8.4) [N12571];
- "33.2.8.1 Output voltage. The specification for V_{Port} in Table 33–5 shall include line and temperature variations. The voltage potential shall be measured between any conductor of one power pair and any conductor of the other power pair." (IEEE 802.3af Standard 33.2.8.1) [N12571];
- "When the PSE provides power to the PI, it shall conform with Table 33–5, Figure 33–6, and Figure 33–7." (IEEE 802.3-2008 Standard 33.2.8) [N236625];

(IEEE 802.3-2008 Table 33-5) [N236625-26].

Table 33–5—PSE output PI electrical requirements for all PD classes, unless otherwise specified

Item	Parameter	Symbol	Unit	Min	Max	Additional information
1	Output voltage	V_{Port}	Vdc	44	57	See 33.2.8.1
2	Load regulation		V	44	57	See 33.2.8.2
3	Power feeding ripple and noise:					
	f < 500 Hz		V_{PP}		0.5	See 33.2.8.3
	500 Hz to 150 kHz		V_{PP}		0.2	
	150 kHz to 500 kHz		V_{PP}		0.15	
	500 kHz to 1 MHz		V_{PP}		0.1	
4	Maximum output current in normal powering mode at PSE min output voltage	I_{Port_max}	mAdc	350		See 33.2.8.4
5	Output current in startup mode	I_{Inrush}	mA	400	450	See 33.2.8.5
6	a) IDLE state current 1	I_{Min1}	mA	0	5	Relevant for 33.2.10.1.2. PSE removes power for $t > T_{MPDO}$
	b) IDLE state current 2	I_{Min2}	mA	5	10	Relevant for 33.2.10.1.2. PSE may or may not remove power for $t > T_{MPDO}$
7a	PD Maintain Power Signature dropout time limit	T_{MPDO}	ms	300	400	See 33.2.10
7b	PD Maintain Power Signature time for validity	T_{MPS}	ms	60		See 33.2.10
8	Overload current detection range	I_{CUT}	mA	15400/ V_{Port}	400	See 33.2.8.6
9	Overload time limit	T_{ovld}	ms	50	75	See 33.2.8.7
10	Output current – at short circuit condition	I_{LIM}	mA	400	450	See 33.2.8.8
11	Short circuit time limit	T_{LIM}	ms	50	75	See 33.2.8.9
12	Turn on rise time	T_{Rise}	µs	15		From 10% to 90% of V_{Port}
13a	Turn off time	T_{Off}	ms		500	See 33.2.8.10
13b	Turn off voltage	V_{Off}	Vdc		2.8	See 33.2.8.11
14	Continuous output power	P_{Port}	W	15.4		Over the range of output voltage. Averaged over 1 second.

Table 33–5—PSE output PI electrical requirements for all PD classes, unless otherwise specified *(continued)*

Item	Parameter	Symbol	Unit	Min	Max	Additional information
15	Current unbalance	I_{unb}	mA		10.5	See 33.2.8.12
16	Power turn on time	T_{pon}	ms		400	See 33.2.8.13
17	Detection backoff time	T_{dbo}	sec	2		PSE detection backoff time limit.
18	Output capacitance during detection mode	C_{out}	nF		520	
19	Detection timing	T_{det}	ms		500	Time to complete detection of a PD.
20	Classification timing	T_{pdc}	ms	10	75	Time to classify the PD.
21	Error delay timing	T_{ed}	ms	750		Delay before PSE may attempt subsequent powering after power removal because of error condition.

Under the 802.3af and 802.3at Standards, power supplied by the secondary power source to the access device ("Powered End Station" / "Powered Device (PD)") is controlled in response to a preselected condition of the voltage level, consistent with Table 33.2 of the Standard.

	Identification: This element involves (a) "controlling power supplied by said secondary power source to said access device," (b) "in response to a preselected condition of said voltage level." • (a) controlling power supplied by said secondary power source to said access device: Controlling power supplied by the secondary power source (addressed above) to the access device (powered device, addressed above) is increasing, maintaining, or decreasing the power supplied by the secondary power source to the access device, either (a) via the valve or switch (under *theory 1* for the secondary power source), or (b) by increasing the power delivered from the main power source (under *theory 2* for the secondary power source). • (b) in response to a preselected condition of said voltage level: The power from the secondary power source is controlled based on a preselected condition of the voltage level. The preselected condition is a voltage level on the signaling pair, chosen as part of the design of the power sourcing equipment (data node), that indicates whether a powered device (access device) is able to accept remote power from the data node, whether remote power should be maintained, or whether remote power should be removed. The power sourcing equipment (data nodes) contains circuitry that examines the voltage level on the data signaling pairs in response to a series of low level currents (detection currents, addressed above). These voltage levels are compared to a set of values previously stored with in the circuitry. If the signature of this series of voltage levels

	falls within the range of conditions which have been preselected, then the power sourcing equipment (data nodes) increases, maintains, or decreases the power over the data signaling pairs. *Doctrine of equivalents*: To the extent that the contentions described above do not constitute literal infringement of this element, they constitute infringement under the doctrine of equivalents under the following two theories because any differences between the claim element and the features of the Accused Instrumentalities are insubstantial. • theory 1: To the extent that the power sourcing equipment apply a voltage and subsequently sense a signature current, applying (or delivering) a low level voltage and controlling the power supplied by the secondary power source in response to a preselected condition of the resulting current level is equivalent to applying (or delivering) a low level current and controlling the power supplied by the secondary power source in response to preselected condition of the resulting voltage level because, for example, it (a) performs substantially the same function, (b) in substantially the same way (*e.g.*, using power rather than a data signal), (c) to obtain substantially the same result. • theory 2: To the extent that the power sourcing equipment apply multiple (*e.g.*, two or more) detection currents / voltages and subsequently sense (element [c]) and control (element [d]) based on the resulting currents

	/ voltages on the data signaling pair, using multiple detection currents / voltages is equivalent to applying a single current / voltage because, for example, it (a) performs substantially the same function, (b) in substantially the same way (*e.g.*, using power rather than a data signal), (c) to obtain substantially the same result. • The doctrine of equivalents applies to either of the two theories individually or together in combination.
Claim 9	
Method according to claim 6, including the step of continuing to sense voltage level and to decrease power from the secondary power source if voltage level drops on the data signaling pair, indicating removal of the access device.	*Sample evidence (HP statements, depictions, and other documentation) includes*: • *See* claim 6; • "The PD must continue to draw a minimum current. If it does not (for example, when the device is unplugged) then the PSE removes the power and the discovery process begins again." (HP ProCurve Power over Ethernet (PoE/PoE+) Planning and Implementation Guide [N237047]; • "Disconnecting a PD from a port causes the switch to stop providing power to that port and makes that power available to other ports configured for PoE operation." (HP ProCurve Power over Ethernet (PoE/PoE+) Planning and Implementation Guide) [N237082]; • "Disconnecting a PD from a port causes the switch to stop providing PoE power to that port and makes the power available to other ports configured for PoE operation." (Power Over Ethernet (PoE) Operation for the Series 2600-

	PWR Switches) [N238141]; • "If, for example, the PD is unplugged; the PSE will discontinue power supply over the cable." (HP ProCurv Switch 2610 Series—PoE Support and Compatibility) [N290385]; • "The PD must continue to draw a minimum current. If it does not (for example, when the device is unplugged) then the PSE removes the power and the discovery process begins again." (HP Power over Ethernet (PoE/ PoE+ Planning and Implementation Guide) [N289915]. *802.3af, 802.3at, and 802.3-2008 Standards statements and depictions include*: • "The PSE monitors the Maintain Power Signature (MPS) and removes power when it is no longer requested or required." (IEEE 802.3af Standard Abstract) [N12519]; • "Figure 33-7 shows the PSE monitor state diagrams. These state diagrams monitor for overload current, short circuit, inrush current, and the absence of the Maintain Power Signature (MPS). If any of these conditions exists for longer than its related time limit, the power will be removed from the PI." (IEEE 802.3af Standard 33.2.10 [N12573]; (IEEE 802.3-2008 Standard 33.2.10 [N236628]; (IEEE 802.3af Standard Figure 33-7 [N12565] and IEEE 802.3-2009 Standard Figure 33-7) [N236620]); • "Figure 33-10 shows the PSE monitor state diagram. These state diagrams monitor for inrush current and the absence of the Maintain Power Signature (MPS). If any of these

	conditions exist for longer that its related time limit, the power is removed from the PI." (IEEE 802.3at Standard 33.2.9) [N151904]; • "This clause specifies the following: e) A method for scaling supplied power back to the detect level when power is no longer requested or required" (IEEE 802.3-2008 Standard 33.1) [N236610]. Under the IEEE 802.3af and IEEE 802.3at Standards, the power sourcing equipment monitors (continues to sense) the voltage level by monitoring the "Main Power Signature" and decreases or "removes" power when the voltage level drops indicating that it is no longer requested or required. *Identification*: This element includes the steps of (a) continuing to sense voltage level, and (b) to decrease power from the secondary power source if voltage level drops on the data signaling pair (addressed above), indicating removal of the access device. • (a) continuing to sense voltage level. HP's power sourcing equipment (data nodes, addressed above), and the power sourcing equipment of others used in connection with HP's powered devices (access devices), continue to sense the voltage level on the data signaling pairs (addressed above) after operating power is delivered (addressed above) using the circuitry in the power sourcing equipment (that may be part of an integrated circuit). • (b) decrease power from the secondary power source if voltage level drops on the data signaling pair, indicating removal of the access device. HP's power sourcing

	equipment (data nodes), and the power sourcing equipment of others used in connection with HP's powered devices (access devices) decrease power from the secondary power source (addressed above) if voltage level drops on the data signaling pair, indicating removal of access device. If the access device is removed, the power sourcing equipment (data nodes) sense the voltage drop and cease to provide operating power to the powered device (access device) either (a) via the valve or switch (under *theory 1* for the secondary power source), or (b) by decreasing the power delivered from the secondary power source (under *theory 2* for the secondary power source). *Doctrine of equivalents*: To the extent that the power sourcing equipment apply a voltage and sense a current, continuing to sense the current level and to decrease power from the secondary power source if current level drops on the data signaling pair, indicating removal of the access device, is equivalent to continuing to sense the voltage level and to decrease power from the secondary power source if voltage level drops on the data signaling pair, indicating removal of the access device because, for example, it (a) performs substantially the same function, (b) in substantially the same way (*e.g.*, using power rather than a data signal), (c) to obtain substantially the same result.
Claim 10	
10. Method according to claim 6, wherein said data	*Sample evidence (HP statements, depictions, and other documentation) includes*:

node is an Ethernet switch.	• *See* Claim 6, element [a-1]. *802.3af, 802.3at, and 802.3-2008 Standards statements and depictions include*: • *See* Claim 6, element [a-1]. *Identification*: The "Ethernet switch" is each HP Power over Ethernet switch and each Power over Ethernet switch made by others used in connection with HP's powered devices (access devices). HP's Power over Ethernet switches, and the switches made by others, have multiple ports (*e.g.*, 8-ports, 24-ports) and can switch data between ports, providing switching functionality. Non-limiting examples of such switches are listed in the main body of these Infringement Contentions and are identified as Accused Instrumentalities for various Defendants under the heading: "*power sourcing equipment (data nodes)*." *Doctrine of equivalents*: To the extent that the contentions described above do not constitute literal infringement of this element, they constitute infringement under the doctrine of equivalents because any differences between the claim element and the features of the Accused Instrumentalities are insubstantial. To the extent that the identified switches are not literally Ethernet switches or are not literally "adapted for data switching," they handle and switch data in a way that is equivalent to "Ethernet switches adapted for data switching" because, for example, they (a) perform the same function—provide switching functionally, (b) in substantially the same way—*e.g.*, via multiple ports, (c) to obtain substantially the same result—switching data between ports

	and connected devices.
Claim 11	
11. Method according to claim 6 wherein said data signaling pair is a pair of wires used to transmit data within an Ethernet cable.	*Sample evidence (HP statements, depictions, and other documentation) includes*: • *See* Claim 6, element [a-3]. *802.3af, 802.3at, and 802.3-2008 Standards statements and depictions include*: • *See* Claim 6, element [a-3]. *Identification*: The "pair of wires used to transmit data within an Ethernet cable" is a pair of wires in an Ethernet cable arranged to connect and transmit data and power between data nodes (addressed above) and access devices (addressed above). A non-limiting example of such a pair of wires used to transmit data within an Ethernet cable is a pair of twisted wires found in a Category 5 (CAT-5) Ethernet cable used to transmit data and power. In this non-limiting example, a pair of wires used to transmit data within an Ethernet cable can be the pair of wires that connect pins 1 and 2 of the RJ-45 connector of the power sourcing equipment (data node) to the corresponding pins of the powered device (access device).
Claim 12	
12. Method according to claim 6, wherein said low level current is a current used to determine whether	*Sample evidence (HP statements, depictions, and other documentation) includes*: • *See* Claim 6, element [b]; • "DEVICE DISCOVERY A standard-compliant PSE such

the access device is capable of accepting remote power.	as the 3Com Switch 5500-EI PWR or Power over Ethernet Multiport Midspan Solution uses a signal detection scheme to ensure that network devices won't be damaged by the addition of power. This powered-device discovery lets standard, nonstandard, and unpowered devices be connected on the same Ethernet infrastructure without special wiring or device configurations. The IEEE 802.3af discovery scheme is known as Resistive Power Discovery, and relies on 25 K (nominal) resistors integrated into PoE network devices. Before sending full power onto the network, the PSE tests the resistance of connected devices with a series of two very low-voltage 'discovery' signals. The second signal uses a slightly higher voltage than the first, but neither is powerful enough to damage an incompatible device. After the PSE has determined which ports are connected to IEEE 802.3af-compliant devices, it injects the full 48 VDC power to those devices only. It will not send power to devices that failed either of the two resistance tests." (3Com Solutions: Power Over Ethernet) [N1932]. *802.3af, 802.3at, and 802.3-2008 Standards statements and depictions include:* • *See* Claim 6, element [b]. *Identification*: The low level current used to determine whether the access device is capable of accepting remote power, delivered from the main power source (addressed above) to the access

	device (powered device, addressed above) over the data signaling pair (addressed above), is the detection current (for example (non-limiting), in the range of 10 to 500 micro amps), that is used (as opposed to a data signal) to determine whether the access device (powered device, addressed above) can receive operating power. *Doctrine of equivalents*: To the extent that the contentions described above do not constitute literal infringement of this element, they constitute infringement under the doctrine of equivalents under the following three theories because any differences between the claim element and the features of the Accused Instrumentalities are insubstantial. • theory 1: The detection current delivered from the power sourcing equipment (data node) is equivalent to a low level current used to determine whether the access device is capable of accepting remote power because, for example, it (a) is power current (as opposed to a data signal) that performs the same function—creates a response from a powered device (access device), (b) in substantially the same way—over the data signaling pair, (c) to obtain substantially the same result—it determines whether the power sourcing equipment (data node) should deliver operating power to the powered device (access device) over the data signaling pair. • theory 2: To the extent that the power sourcing equipment apply a voltage and subsequently measure a signature current, applying (or delivering) a low level voltage and measuring a signature current is equivalent to applying (or

	delivering) a low level current and measuring a signature voltage because (1) from an electrical perspective, delivering a current and measuring a voltage is equivalent to delivering a voltage and measuring a current, and (2) it (a) performs the same function—creates a response from a powered device (access device), (b) in substantially the same way—over the data signaling pair, (c) to obtain substantially the same result—it determines whether the power sourcing equipment (data node) should deliver operating power to the powered device (access device) over the data signaling pair. • theory 3: To the extent that the power sourcing equipment apply multiple (*e.g.*, two or more) detection currents / voltages and subsequently sense (Claim 6, element [c]) and control (Claim 6, element [d]) based on the resulting currents / voltages on the data signaling pair, using multiple detection currents / voltages is equivalent to applying a single current / voltage because, for example, it (a) performs the same function—creates a response from a powered device (access device), (b) in substantially the same way—over the data signaling pair, (c) to obtain substantially the same result—it determines whether the power sourcing equipment (data node) should deliver operating power to the powered device (access device) over the data signaling pair. • The doctrine of equivalents applies to any one of the three theories individually or any combination of two or three theories.

Claim 13	
13. Method according to claim 6, wherein said low level current is insufficient to operate said access device, but sufficient to generate a voltage level on said data signaling pair that is used to determine whether said access device is capable of accepting remote power.	*Sample evidence (HP statements, depictions, and other documentation) includes*: • *See* Claim 6, elements [b-d]. *802.3af, 802.3at, and 802.3-2008 Standards statements and depictions include:* • *See* Claim 6, elements [b-d]. *Identification*: The low level current delivered from the main power source (addressed above) to the access device (powered device, addressed above) over the data signaling pair (addressed above) is the detection current (for example (non-limiting), in the range of 10 to 500 micro amps), that is used (as opposed to a data signal) to determine whether the access device (powered device) can receive operating power. This low level current is insufficient to operate said access device (powered device, addressed above), but sufficient to generate a voltage level on said data signaling pair (addressed above) that is used to determine whether said access device (powered device, addressed above) is capable of accepting remote power *Doctrine of equivalents*: To the extent that the contentions described above do not constitute literal infringement of this element, they constitute infringement under the doctrine of equivalents under the following three theories because any differences between the claim element and the features of the Accused Instrumentalities are insubstantial.

	• theory 1: The detection current delivered from the power sourcing equipment (data node) is equivalent to a low level current that is insufficient to operate said access device, but sufficient to generate a voltage level on said data signaling pair that is used to determine whether said access device is capable of accepting remote power, because, for example, it (a) is power current (as opposed to a data signal) that performs the same function—creates a response from a powered device (access device), (b) in substantially the same way—over the data signaling pair, (c) to obtain substantially the same result—it determines whether the power sourcing equipment (data node) should deliver operating power to the powered device (access device) over the data signaling pair. • theory 2: To the extent that the power sourcing equipment apply a voltage and subsequently measure a signature current, applying (or delivering) a low level voltage and measuring a signature current is equivalent to applying (or delivering) a low level current and measuring a signature voltage because (1) from an electrical perspective, delivering a current and measuring a voltage is equivalent to delivering a voltage and measuring a current, and (2) it (a) performs the same function—creates a response from a powered device (access device), (b) in substantially the same way—over the data signaling pair, (c) to obtain substantially the same result—it determines whether the power sourcing equipment (data node) should deliver operating power to the powered device (access device) over

	the data signaling pair. • theory 3: To the extent that the power sourcing equipment apply multiple (*e.g.*, two or more) detection currents / voltages and subsequently sense (Claim 6, element [c]) and control (Claim 6, element [d]) based on the resulting currents / voltages on the data signaling pair, using multiple detection currents / voltages is equivalent to applying a single current / voltage because, for example, it (a) performs the same function—creates a response from a powered device (access device), (b) in substantially the same way—over the data signaling pair, (c) to obtain substantially the same result—it determines whether the power sourcing equipment (data node) should deliver operating power to the powered device (access device) over the data signaling pair. • The doctrine of equivalents applies to any one of the three theories individually or any combination of two or three theories.
Claim 14	
14. Method according to claim 6, wherein controlling power supplied by the secondary power source involves increasing the level of the low level current to a level sufficient to operate said	*Sample evidence (HP statements, depictions, and other documentation) includes*: • *See* Claim 6, element [d]. *802.3af, 802.3at, and 802.3-2008 Standards statements and depictions include:* • *See* Claim 6, element [d]. *Identification*: Controlling power supplied by the secondary

access device.	power source (addressed above) to the access device (powered device, addressed above) that involves increasing the level of the low level current (addressed above) to a level sufficient to operate said access device, is increasing the power supplied by the secondary power source (addressed above) to the access device (powered device, addressed above), either (a) via the valve or switch (under *theory 1* for the secondary power source), or (b) by increasing the power delivered from the main power source (under *theory 2* for the secondary power source), to a level such that the access device (powered device, addressed above) can operate. *Doctrine of equivalents*: To the extent that the contentions described above do not constitute literal infringement of this element, they constitute infringement under the doctrine of equivalents under the following two theories because any differences between the claim element and the features of the Accused Instrumentalities are insubstantial. • theory 1: To the extent that the power sourcing equipment apply a voltage and subsequently sense a signature current, applying (or delivering) a low level voltage and controlling the power supplied by the secondary power source in response to a preselected condition of the resulting current level is equivalent to applying (or delivering) a low level current and controlling the power supplied by the secondary power source in response to preselected condition of the resulting voltage level by increasing the level of the low level current to a level sufficient to operate said access

	device because, for example, it (a) performs substantially the same function, (b) in substantially the same way (*e.g.*, using power rather than a data signal), (c) to obtain substantially the same result. • theory 2: To the extent that the power sourcing equipment apply multiple (*e.g.*, two or more) detection currents / voltages and subsequently sense (Claim 6, element [c]) and control (Claim 6, element [d]) based on the resulting currents / voltages on the data signaling pair, using multiple detection currents / voltages is equivalent to applying a single current / voltage because, for example, it (a) performs substantially the same function, (b) in substantially the same way (*e.g.*, using power rather than a data signal), (c) to obtain substantially the same result. • The doctrine of equivalents applies to either of the two theories individually or together in combination.
Claim 15	
15. Method according to claim 6, wherein said secondary power source is the same source of power as the main power source.	*Sample evidence (HP statements, depictions, and other documentation) includes*: • *See* Claim 6, elements [a-4] and [a-5]. *802.3af, 802.3at, and 802.3-2008 Standards statements and depictions include:* • *See* Claim 6, elements [a-4] and [a-5]. *Identification*: HP's power sourcing equipment (data nodes), and the power sourcing equipment (data nodes) made by others used in

	connection with HP's powered devices (access devices), have (a) access to "a main power source connected to supply power to the data node," and (b) use "a secondary power source arranged to supply power from the data node via said data signaling pair to the access device." *See* Claim 6, elements [a-4] and [a-5] above. The secondary power source can be the same source of power as the main power source. The secondary power source is the source of secondary power that provides power for the secondary function of supplying power from the power sourcing equipment (data node) via said data signaling pair (addressed above) to the powered device (access device) which occurs, under certain circumstances, after the main power source performs the main or primary functions of (i) providing power to the power sourcing equipment (data nodes), and (ii) delivering the low level current to the powered device (access devices). The power sourcing equipment (data nodes) use a secondary power source (source of secondary power) which is the same as the main power source under the three theories for main power source set forth above (*e.g.*, (i) a power supply, (ii) a multiple power supply configuration, or (iii) the AC outlet or power strip connected to the power sourcing equipment (data node) using a power cord).
Claim 16	
16. Method according to claim 6, wherein said secondary power source is the same physical device as the main power source.	*Sample evidence (HP statements, depictions, and other documentation) includes*: • *See* Claim 6, elements [a-4] and [a-5]. *802.3af, 802.3at, and 802.3-2008 Standards statements and depictions include:*

	• *See* Claim 6, elements [a-4] and [a-5]. *Identification*: HP's power sourcing equipment (data nodes), and the power sourcing equipment (data nodes) made by others used in connection with HP's powered devices (access devices), have (a) access to "a main power source connected to supply power to the data node," and (b) use "a secondary power source arranged to supply power from the data node via said data signaling pair to the access device." *See* Claim 6, elements [a-4] and [a-5] above. The secondary power source can be the same physical device as the main power source. The secondary power source is the source of secondary power that provides power for the secondary function of supplying power from the data node via said data signaling pair to the powered device (access device) which occurs, under certain circumstances, after the main power source performs the main or primary functions of (i) providing power to the power sourcing equipment (data nodes), and (ii) delivering the low level current to the powered device (access devices). The power sourcing equipment (data nodes) use a secondary power source (source of secondary power) which can be the same physical device as the main power source under the three theories for main power source set forth above (*e.g.*, (i) a power supply, (ii) a multiple power supply configuration, or (iii) the AC outlet or power strip connected to the power sourcing equipment (data node) using a power cord).
Claim 17	
17. Method according to	*Sample evidence (HP statements, depictions, and other*

claim 6, wherein said main power source provides a DC current flow.	*documentation) includes*: • *See* Claim 6, element [a-4]. *802.3af, 802.3at, and 802.3-2008 Standards statements and depictions include:* • *See* Claim 6, element [a-4]. *Identification*: There are three theories under which the "main power source," that provides a DC current flow, is connected, via electrical connections, wiring, or cables, to supply certain power requirements to at least certain electrical components the data nodes: • theory 1: The "main power source" that provides a DC current flow to the power sourcing equipment (data nodes, addressed above) is a DC power supply that provides DC power to components of the data nodes. A non-limiting example of such a DC power supply that provides a DC current flow is a power supply that provides 12V and 48V outputs to power components of the data node. • theory 2: The "main power source" that provides a DC current flow is a combination of power supplies, arranged in series or parallel, that provides DC power to components of the data nodes. As a non-limiting example, the combination of power supplies can consist of (1) a power supply that provides a 12V output to power some components of the data node, and (2) a power supply that provides a 48V output to power other components of the data node. The main power source

	can be, or be connected to receive power from, a power rack. • theory 3: The "main power source" is an power source provided via a power cord that is adapted to connect an outlet to the power sourcing equipment (data nodes). The connection can be established by, for example, plugging one end of the power cord into a dedicated grounded outlet or power strip and the other end into the power socket of the data node. *Doctrine of equivalents*: To the extent that the contentions described above do not constitute literal infringement of this element, they constitute infringement under the doctrine of equivalents under the following theories because any differences between the claim element and the features of the Accused Instrumentalities are insubstantial. • doctrine of equivalents for theory 3: To the extent that an AC source of power is not literally a "main power source" that provides a DC current flow, an AC source of power, in the context of the '930 Patent, is equivalent to a main power source that provides a DC current flow because an AC and DC source of power are interchangeable (they can be converted back and forth) and perform (a) substantially the same function, (b) in substantially the same way, (c) to obtain substantially the same result. Specifically, whether the power source is

	originally DC or AC, that is converted into DC, is immaterial in the context of the invention. • doctrine of equivalents for theory 2: To the extent that a combination of power supplies (*e.g.*, a combination of power supplies in serial or in parallel) is not literally a main power source that provides a DC current flow, such a combination would constitute a main power source that provides a DC current flow under the doctrine of equivalents because such a combination performs (a) substantially the same function, (b) in substantially the same way, (c) to obtain substantially the same result. Specifically, whether the power supply consists of a single power supply or multiple power supplies, in series, in parallel, or a combination of both, is immaterial in the context of the invention.
Claim 18	
18. Method according to claim 6, wherein there are at least two data signaling pairs connected between the data node and the access device.	*Sample evidence (HP statements, depictions, and other documentation) includes*: • *See* Claim 6, element [a-3]. *802.3af, 802.3at, and 802.3-2008 Standards statements and depictions include:* • *See* Claim 6, element [a-3]. *Identification*: The "at least two data signaling pairs connected between the data node and the access device" are two pairs of

	wires in an Ethernet cable arranged to connect and transmit data and power between data nodes (addressed above) and access devices (addressed above). A non-limiting example of such a data signaling pairs are the pairs of twisted wires found in a Category 5 (CAT-5) Ethernet cable used to transmit data and power.
Claim 19	
19. Method according to claim 6, wherein sensing the voltage level on the data signaling pair includes at least two sensed measurements.	*Sample evidence (HP statements, depictions, and other documentation) includes*: • *See* Claim 6, element [c]; • "Before sending full power onto the network, the PSE tests the resistance of connected devices with a series of two very low-voltage 'discovery' signals. … It will not send power to devices that failed either of the two resistance tests." (3Com Solutions: Power Over Ethernet) [N1932]. *802.3af, 802.3at, and 802.3-2008 Standards statements and depictions include:* • *See* Claim 6, element [c]. *Identification*: HP's power sourcing equipment (data nodes, addressed above), and the power sourcing equipment of others used in connection with HP's powered devices (access devices), includes an integrated circuit that contains circuitry that senses at least two voltage levels (or current levels) on the data signaling pair (addressed above), *e.g.*, the signature of the powered device (access device), in response to delivering a low level current (or

	multiple low level currents) (addressed above) delivered on (or applied to) the data signaling pair. *Doctrine of equivalents*: To the extent that the contentions described above do not constitute literal infringement of this element, they constitute infringement under the doctrine of equivalents under the following two theories because any differences between the claim element and the features of the Accused Instrumentalities are insubstantial. • theory 1: To the extent that the power sourcing equipment apply a voltage and subsequently sense at least two current measurements, applying (or delivering) a low level voltage and measuring at least two current measurements is equivalent to applying (or delivering) a low level current and sensing at least two signature voltages for the reasons set forth above, because, for example, it (a) performs substantially the same function, (b) in substantially the same way (*e.g.*, using power rather than a data signal), (c) to obtain substantially the same result. • theory 2: To the extent that the power sourcing equipment does not directly sense at least two voltage / current levels on the data signaling pair, sensing at least two voltage / current level across other components in the low level current circuit, for example, across a sense resistor, is electrically equivalent to sensing at least two voltage level / current level on the data signaling pair because, for example, it (a) performs

	substantially the same function, (b) in substantially the same way (*e.g.*, using power rather than a data signal), (c) to obtain substantially the same result. • The doctrine of equivalents applies to either of the two theories individually or together in combination.
Claim 20	
Pre: Method for remotely powering access equipment in an Ethernet data network, comprising	*Sample evidence (HP statements, depictions, and other documentation) includes*: • *See* elements [a] – [e] below; • *See* Claim 6, [pre]. *802.3af, 802.3at, and 802.3-2008 Standards statements and depictions include*: • *See* elements [a] – [e] below; • *See* Claim 6, [pre]. *Identification*: The preamble is a method for (a) "remotely powering access equipment," (b) "in an Ethernet data network." • (a) remotely powering access equipment: Power sourcing equipment (data nodes, addressed below), made by HP or others, combined with powered devices (access devices, addressed below), made by HP or others, are used to practice a method for remotely powering access equipment (the powered devices, access devices) as addressed in elements [a] through [d] below. The access equipment are the powered devices (access devices) that access data and power through a network. Non-limiting examples of such access equipment include (a) phones (*e.g.*, IP phones), (b)

	wireless access points, (c) cameras (*e.g.*, security cameras), (d) magnetic card readers, and (e) video kiosks. Non-limiting examples of such access equipment are also listed in the main body of these Infringement Contentions and are identified as the Accused Instrumentalities for various Defendants under the headings: "*powered devices (access devices).*" • (b) <u>in an Ethernet data network</u>: The Ethernet data network refers to the Ethernet network that transmits data and power between power sourcing equipment (data nodes) and powered devices (access devices).
[a-1] providing an Ethernet data node adapted for data switching	<u>*Sample evidence (HP statements, depictions, and other documentation) includes*</u>: • *See* Claim 6, element [a-1]. <u>*802.3af, 802.3at, and 802.3-2008 Standards statements and depictions include*</u>: • *See* Claim 6, element [a-1]. <u>*Identification*</u>: The "Ethernet data node adapted for data switching" is each HP Power over Ethernet switch and router, and each Power over Ethernet switch and router made by others used in connection with HP's powered devices (access device). HP's Power over Ethernet switches and routers, and the switches and routers made by others, have multiple ports (*e.g.*, 8-ports, 24-ports) and can switch data between ports, providing switching functionality. Non-limiting examples of such Ethernet switches and routers are listed in the main body of these Infringement

	Contentions and are identified as Accused Instrumentalities for various Defendants under the heading: "*power sourcing equipment (data nodes)*." *Doctrine of equivalents*: To the extent that the contentions described above do not constitute literal infringement of this element, they constitute infringement under the doctrine of equivalents because any differences between the claim element and the features of the Accused Instrumentalities are insubstantial. To the extent that the identified "Ethernet data nodes" (Ethernet switches and routers) are not literally "adapted for data switching," they handle and switch data in a way that is equivalent to "data switching" because, for example, they (a) perform the same function—provide switching functionally, (b) in substantially the same way—*e.g.*, via multiple ports, (c) to obtain substantially the same result—switching data between ports and connected devices.
[a-2] an access device adapted for data transmission	*See* Claim 6, element [a-2] above (which is identical).
[a-3] at least one data signaling pair connected between the data node and the access device and arranged to transmit data therebetween	*See* Claim 6, element [a-3] above (which is identical).
[a-4] a main power source connected to supply	*See* Claim 6, element [a-4] above (which is identical), including doctrine of equivalents.

power to the data node, and	
[a-5] a secondary power source arranged to supply power from the data node via said data signaling pair to the access device,	*See* Claim 6, element [a-4] above (which is identical), including doctrine of equivalents.
[b] delivering a low level current from said main power source to the access device over said data signaling pair,	*See* Claim 6, element [b] above (which is identical), including doctrine of equivalents.
[c] sensing a voltage level on the data signaling pair in response to the low level current	*See* Claim 6, element [c] above (which is identical), including doctrine of equivalents.
[d] determining whether the access device is capable of accepting remote power based on the sensed voltage level	*Sample evidence (HP statements, depictions, and other documentation) includes*: • *See* Claim 6, elements [b-d]; • "In most networks, PSE will be connected to some devices that support PoE and some that do not. Consequently, in order to prevent damage to non-PoE devices, the 802.3af specification includes a negotiation mechanism between PSEs and the stations connected to them." (HP ProCurve Switch 2610 Series—PoE Support and Compatibility) [N290385]; • "DEVICE DISCOVERY A standard-compliant PSE such as the 3Com Switch 5500-EI PWR or Power over Ethernet

	Multiport Midspan Solution uses a signal detection scheme to ensure that network devices won't be damaged by the addition of power. This powered-device discovery lets standard, nonstandard, and unpowered devices be connected on the same Ethernet infrastructure without special wiring or device configurations. The IEEE 802.3af discovery scheme is known as Resistive Power Discovery, and relies on 25 K (nominal) resistors integrated into PoE network devices. Before sending full power onto the network, the PSE tests the resistance of connected devices with a series of two very low-voltage 'discovery' signals. The second signal uses a slightly higher voltage than the first, but neither is powerful enough to damage an incompatible device. After the PSE has determined which ports are connected to IEEE 802.3af-compliant devices, it injects the full 48 VDC power to those devices only. It will not send power to devices that failed either of the two resistance tests." (3Com Solutions: Power Over Ethernet) [N1932]. *802.3af, 802.3at, and 802.3-2008 Standards statements and depictions include*: • *See* Claim 6, elements [b-d]. *Identification*: Determining whether the access device (powered device, addressed above) is capable of accepting remote power based on the sensed voltage level (from element [c]) is determining whether the access device (powered device, addressed

	above) is capable of accepting remote power, delivered from the main power source (addressed above) to the access device (powered device, addressed above) over the data signaling pair (addressed above), based on the sensed voltage level (from element [c]).
[e] controlling power supplied by said secondary power source to said access device in response to a preselected condition of said voltage level.	*See* Claim 6, element [d] above (which is identical), including doctrine of equivalents.
Claim 21	
Pre: Method for remotely powering access equipment in an Ethernet data network, comprising	*See* Claim 20, element [pre] above (which is identical).
[a-1] providing a data node adapted for data switching	*See* Claim 6, element [a-1] above (which is identical), including doctrine of equivalents.
[a-2] an access device adapted for data transmission	*See* Claim 6, element [a-2] above (which is identical).
[a-3] at least one data signaling pair connected between the data node and the access device and	*See* Claim 6, element [a-3] above (which is identical).

arranged to transmit data therebetween	
[a-4] a main power source connected to supply power to the data node, and	*See* Claim 6, element [a-4] above (which is identical), including doctrine of equivalents.
[a-5] a secondary power source arranged to supply power from the data node via said data signaling pair to the access device,	*See* Claim 6, element [a-5] above (which is identical), including doctrine of equivalents.
[b] delivering a current from said main power source to the access device over said data signaling pair, said current being insufficient, by itself, to operate said access device connected to the data signaling pair	*Sample evidence (HP statements, depictions, and other documentation) includes*: • *See* Claim 6, element [b]; • *See* Claim 13; • "A discovery process, run from the PSE, examines the Ethernet cables, looking for devices that comply with the specification. It does this by applying a small current-limited voltage to the cable and checks for the presence of a 25k ohm resistor in the remote device. Only if the resistor is present, will the full wattage be applied..." (HP ProCurve Power over Ethernet (PoE/PoE+) Planning and Implementation Guide) [N237047]; • DEVICE DISCOVERY A standard-compliant PSE such as the 3Com Switch 5500-EI PWR or Power over Ethernet Multiport Midspan Solution uses a signal detection scheme to ensure that network devices won't be damaged by the addition of power. This powered-device discovery lets

	standard, nonstandard, and unpowered devices be connected on the same Ethernet infrastructure without special wiring or device configurations. The IEEE 802.3af discovery scheme is known as Resistive Power Discovery, and relies on 25 K (nominal) resistors integrated into PoE network devices. Before sending full power onto the network, the PSE tests the resistance of connected devices with a series of two very low-voltage 'discovery' signals. The second signal uses a slightly higher voltage than the first, but neither is powerful enough to damage an incompatible device. After the PSE has determined which ports are connected to IEEE 802.3af-compliant devices, it injects the full 48 VDC power to those devices only. It will not send power to devices that failed either of the two resistance tests." (3Com Solutions: Power Over Ethernet) [N1932]. *802.3af, 802.3at, and 802.3-2008 Standards statements and depictions include*: • *See* Claim 6, element [b]. *Identification*: The current delivered from the main power source (addressed above) to the access device (powered device, addressed above) over the data signaling pair (addressed above) is the detection current (for example (non-limiting), in the range of 10 to 500 micro amps), that is used (as opposed to a data signal) to determine whether the access device (powered device) can receive operating power.

	Doctrine of equivalents: To the extent that the contentions described above do not constitute literal infringement of this element, they constitute infringement under the doctrine of equivalents under the following three theories because any differences between the claim element and the features of the Accused Instrumentalities are insubstantial. • theory 1: The detection current delivered from the power sourcing equipment (data node) is equivalent to a current delivered from said main power source to the access device over said data signaling pair that is insufficient, by itself, to operate said access device connected to the data signaling pair because, for example, it (a) is power current (as opposed to a data signal) that is insufficient, by itself, to operate the access device, that performs the same function—creates a response from a powered device (access device), (b) in substantially the same way—over the data signaling pair, (c) to obtain substantially the same result—it determines whether the power sourcing equipment (data node) should deliver operating power to the powered device (access device) over the data signaling pair. • theory 2: To the extent that the power sourcing equipment apply a voltage and subsequently measure a signature current, applying (or delivering) a voltage that is insufficient, by itself, to operate the access device, and measuring a signature current is equivalent to applying (or delivering) a current that is insufficient, by itself, to

	operate the access device, and measuring a signature voltage because (1) from an electrical perspective, delivering a current and measuring a voltage is equivalent to delivering a voltage and measuring a current, and (2) it (a) performs the same function—creates a response from a powered device (access device), (b) in substantially the same way—over the data signaling pair, (c) to obtain substantially the same result—it determines whether the power sourcing equipment (data node) should deliver operating power to the powered device (access device) over the data signaling pair. • theory 3: To the extent that the power sourcing equipment apply multiple (*e.g.*, two or more) detection currents / voltages and subsequently sense (element [c]) and control (element [d]) based on the resulting currents / voltages on the data signaling pair, using multiple detection currents / voltages is equivalent to applying a single current / voltage because, for example, it (a) performs the same function—creates a response from a powered device (access device), (b) in substantially the same way—over the data signaling pair, (c) to obtain substantially the same result—it determines whether the power sourcing equipment (data node) should deliver operating power to the powered device (access device) over the data signaling pair.
[c] sensing a voltage level on the data signaling pair in response to the current	*Sample evidence (HP statements, depictions, and other documentation) includes*: • *See* Claim 6, element [c].

	802.3af, 802.3at, and 802.3-2008 Standards statements and depictions include: • *See* Claim 6, element [c]. *Identification*: HP's power sourcing equipment (data nodes, addressed above), and the power sourcing equipment of others used in connection with HP's powered devices (access devices), includes an integrated circuit that contains circuitry that senses a voltage level or current level on the data signaling pair (addressed above), *e.g.*, the signature of the powered device (access device), in response to the current (addressed above) delivered on (or applied to) the data signaling pair. *Doctrine of equivalents*: To the extent that the contentions described above do not constitute literal infringement of this element, they constitute infringement under the doctrine of equivalents under the following three theories because any differences between the claim element and the features of the Accused Instrumentalities are insubstantial. • theory 1: To the extent that the power sourcing equipment apply a voltage and subsequently sense a current, applying (or delivering) a voltage and measuring a current is equivalent to applying (or delivering) a current and sensing a signature voltage for the reasons set forth above, because, for example, it (a) performs substantially the same function, (b) in substantially the same way (*e.g.*, using power rather than a data signal), (c) to obtain substantially the same result.

	• theory 2: To the extent that the power sourcing equipment apply multiple (*e.g.*, two or more) detection currents / voltages and subsequently sense (element [c]) and control (element [d]) based on the resulting currents / voltages on the data signaling pair, using multiple detection currents / voltages is equivalent to applying a single current / voltage because, for example, it (a) performs substantially the same function, (b) in substantially the same way (*e.g.*, using power rather than a data signal), (c) to obtain substantially the same result. • theory 3: To the extent that the power sourcing equipment does not directly sense a voltage / current level on the data signaling pair, sensing a voltage / current level across other components in the current circuit, for example, across a sense resistor, is electrically equivalent to sensing the voltage level / current level on the data signaling pair because, for example, it (a) performs substantially the same function, (b) in substantially the same way (*e.g.*, using power rather than a data signal), (c) to obtain substantially the same result. • The doctrine of equivalents applies to any one of the three theories individually or any combination of two or three theories.
[d] controlling power supplied by said secondary power source to said access device in	*See* Claim 6, element [d] above (which is identical), including doctrine of equivalents.

response to a preselected condition of said voltage level.	
Claim 22	
[pre] Apparatus for remotely powering access equipment in a data network, comprising,	*Sample evidence (HP statements, depictions, and other documentation) includes*: • *See* Claim 6, [pre]. • *See* elements [a] – [e] below. *802.3af, 802.3at, and 802.3-2008 Standards statements and depictions include*: • *See* Claim 6, [pre] above; • *See* elements [a] – [e] below. *Identification*: The preamble is (a) an apparatus for (b) "remotely powering access equipment," (c) "in a data network." • (a) the apparatus comprises the structures identified in elements [a] – [e] below, including (a) a data node, (b) an access device, (c) at least one data signaling pair, (d) a main power source, and (e) a secondary power source. • (b) remotely powering access equipment: Power sourcing equipment (data nodes, addressed below), made by HP or others, combined with powered devices (access devices, addressed below), made by HP or others, are used as part of an apparatus for remotely powering access equipment (the powered devices, access devices) as addressed in elements [a] through [d] below. The access equipment are the powered devices (access devices) that access data and

	power through a network. Non-limiting examples of such access equipment include (a) phones (*e.g.*, IP phones), (b) wireless access points, (c) cameras (*e.g.*, security cameras), (d) magnetic card readers, and (e) video kiosks. Non-limiting examples of such access equipment are also listed in the main body of these Infringement Contentions and are identified as the Accused Instrumentalities for various Defendants under the headings: "*powered devices (access devices).*" • (c) in a data network: The data network refers to the Ethernet network that transmits data and power between power sourcing equipment (data nodes) and powered devices (access devices).
[a] a data node adapted for data switching	*See* Claim 6, element [a-1] (which is identical), including doctrine of equivalents.
[b] an access device adapted for data transmission	*See* Claim 6, element [a-2] (which is identical).
[c] at least one data signaling pair connected between the data node and the access device and arranged to transmit data therebetween	*See* Claim 6, element [a-3] (which is identical).
[d-1] a main power source connected to supply	*See* Claim 6, element [a-4] (which is identical), including doctrine of equivalents.

power to the data node and...	
[d-2] … deliver a low level current from said main power source to the access device over said at least one data signaling pair.	*Sample evidence (HP statements, depictions, and other documentation) includes*: • *See* Claim 6, element [b]. *802.3af, 802.3at, and 802.3-2008 Standards statements and depictions include*: • *See* Claim 6, element [b]. *Identification*: The main power source (addressed above) is connected to deliver a low level current (addressed above, *see* Claim 6, element [b]) from the main power source (addressed above) to the access device (powered device, addressed above) over the data signaling pair (addressed above). *Doctrine of equivalents*: *See* Claim 6, element [b].
[d-3] resulting in a voltage level on the data signaling pair that can be sensed in response to the low level current.	*Sample evidence (HP statements, depictions, and other documentation) includes*: • *See* Claim 6, element [c]. *802.3af, 802.3at, and 802.3-2008 Standards statements and depictions include*: • *See* Claim 6, element [c]. *Identification*: The delivered low level current (addressed above, *see* Claim 6, element [b]) results in a voltage level on the data signaling pair (addressed above) that can be sensed in response to the low level current (addressed above).

	Doctrine of equivalents: *See* Claim 6, elements [b] and [c].
[e -1] a secondary power source arranged supply power from the data node via said data signaling pair to the access device	*See* Claim 6, element [a-5] (which is identical), including doctrine of equivalents.
[e -2] wherein the power supplied by said secondary power source to the access device is controlled in response to a preselected condition of the sensed voltage level	*Sample evidence (HP statements, depictions, and other documentation) includes*: • *See* Claim 6, element [d]. *802.3af, 802.3at, and 802.3-2008 Standards statements and depictions include*: • *See* Claim 6, element [d]. *Identification*: This element involves (a) "the power supplied by said secondary power source is controlled," (b) "in response to a preselected condition of said voltage level." • (a) the power supplied by said secondary power source is controlled: Controlling power supplied by the secondary power source (addressed above) to the access device (powered device, addressed above) is increasing, maintaining, or decreasing the power supplied by the secondary power source to the access device, either (a) via the valve or switch (under *theory 1* for the secondary power source), or (b) by increasing the power delivered from the main power source (under *theory 2* for the secondary power source).

	• (b) <u>in response to a preselected condition of said voltage level</u>: The power from the secondary power source (addressed above) is controlled based on a preselected condition of the voltage level. The preselected condition is a voltage level on the signaling pair, chosen as part of the design of the power sourcing equipment (data node), that indicates whether a powered device (access device) is able to accept remote power from the power sourcing equipment (data node), whether remote power should be maintained, or whether remote power should be removed. The power sourcing equipment (data node) contains circuitry that examines the voltage level on the data signaling pairs in response to a series of low level currents (detection currents, addressed above). These voltage levels are compared to a set of values previously stored with in the circuitry. If the signature of this series of voltage levels falls within the range of conditions which have been preselected, then the power sourcing equipment (data nodes) increases, maintains, or decreases the power over the data signaling pairs. <u>*Doctrine of equivalents*</u>: To the extent that the contentions described above do not constitute literal infringement of this element, they constitute infringement under the doctrine of equivalents under the following two theories because any differences between the claim element and the features of the Accused Instrumentality are insubstantial. • <u>theory 1</u>: To the extent that the power sourcing

	equipment apply a voltage and subsequently sense a signature current, applying (or delivering) a low level voltage and controlling the power supplied by the secondary power source in response to a preselected condition of the resulting current level is equivalent to applying (or delivering) a low level current and controlling the power supplied by the secondary power source in response to preselected condition of the resulting voltage level because, for example, it (a) performs substantially the same function, (b) in substantially the same way (*e.g.*, using power rather than a data signal), (c) to obtain substantially the same result. • theory 2: To the extent that the power sourcing equipment apply multiple (*e.g.*, two or more) detection currents / voltages and subsequently sense (element [c]) and control (element [d]) based on the resulting currents / voltages on the data signaling pair, using multiple detection currents / voltages is equivalent to applying a single current / voltage because, for example, it (a) performs substantially the same function, (b) in substantially the same way (*e.g.*, using power rather than a data signal), (c) to obtain substantially the same result. • The doctrine of equivalents applies to either of the two theories individually or together in combination.
Claim 23	
23. Method for remotely powering access	*See* Claim 20, [pre] (which is identical).

equipment in an Ethernet data network, comprising	
[a] providing an access device adapted for data transmission	*See* Claim 20, element [a-2] (which is identical).
[b] connecting said access device to at least one data signaling pair connected between the access device and a data node adapted for data switching, wherein said at least one data signaling pair is arranged to transmit data therebetween;	*Sample evidence (HP statements, depictions, and other documentation) includes*: • *See* Claim 6, elements [a-1] and [a-3]. *802.3af, 802.3at, and 802.3-2008 Standards statements and depictions include*: • *See* Claim 6, elements [a-1] and [a-3]. *Identification*: The access device (powered device, addressed above, *see, e.g.*, Claim 6, element [a-2]) is connected to at least one data signaling pair (addressed above, *see, e.g.*, Claim 6, element [a-3]). The data signaling pair (addressed above) is connected between the access device (powered device, addressed above) and the data node adapted for data switching (addressed above, *see, e.g.*, Claim 6, element [a-1]). The data signaling pair is arranged to transmit data between the access device (powered device, addressed above) and the data node (power sourcing equipment, addressed above). *Doctrine of equivalents:* • *See* Claim 6, element [a-1] for doctrine of equivalents for "data node adapted for data switching."
[c-1] receiving at said	*Sample evidence (HP statements, depictions, and other*

access device a low level current from a main power source over said data signaling pair	*documentation) includes*: • *See* Claim 6, elements [a-4] and [b]. *802.3af, 802.3at, and 802.3-2008 Standards statements and depictions include*: • *See* Claim 6, elements [a-4] and [b]. *Identification*: The access device (powered device, addressed above, *see, e.g.*, Claim 6, element [a-2]) receives a low level current (addressed above, *see, e.g.*, Claim 6, element [b]) from a main power source (addressed above, *see, e.g.*, Claim 6, element [a-4]) over the data signaling pair (addressed above, *see, e.g.*, Claim 6, element [b-3]). *Doctrine of equivalents:* • *See* Claim 6, element [a-4] for doctrine of equivalents for "main power source." • *See* Claim 6, element [b] for doctrine of equivalents for "low level current."
[c-2] wherein said main power source is connected to supply power to the data node;	*Sample evidence (HP statements, depictions, and other documentation) includes*: • *See* Claim 6, element [a-4]. *802.3af, 802.3at, and 802.3-2008 Standards statements and depictions include*: • *See* Claim 6, element [a-4]. *Identification*: The main power source (addressed above, *see, e.g.*, Claim 6, element [a-4]) is connected to supply power to the data

	node (power sourcing equipment, addressed above, *see, e.g.*, Claim 6, element [a-1]). *Doctrine of equivalents:* • *See* Claim 6, element [a-1] for doctrine of equivalents for "data node." • *See* Claim 6, element [a-4] for doctrine of equivalents for "main power source."
[c-3] and wherein a voltage level is generated on the data signaling pair in response to the low level current;	*Sample evidence (HP statements, depictions, and other documentation) includes*: • *See* Claim 6, elements [b] and [c]. *802.3af, 802.3at, and 802.3-2008 Standards statements and depictions include*: • *See* Claim 6, elements [b] and [c]. *Identification*: The low level current (addressed above, *see, e.g.*, Claim 6, element [b]) generates a voltage level on the data signaling pair (addressed above, *see, e.g.*, Claim 6, element [a-3]) based on the signature resistance of the access device (powered device, addressed above). *Doctrine of equivalents:* • *See* Claim 6, element [b], and Claim 23, element [c-1] for doctrine of equivalents for "low level current." • *See* Claim 6, element [c] for doctrine of equivalents for "voltage level."

[d] producing a voltage level on the data signaling pair in response to the low level current, wherein said voltage level can be sensed.	*Sample evidence (HP statements, depictions, and other documentation) includes*: • *See* Claim 6, element [c]. *802.3af, 802.3at, and 802.3-2008 Standards statements and depictions include*: • *See* Claim 6, element [c]. *Identification*: The access device (powered device, addressed above) produces a voltage level on the data signaling pair (addressed above, *see, e.g.*, Claim 6, element [a-3]) in response to the low level current (addressed above). The produced voltage level can be sensed by the data node (addressed above). *Doctrine of equivalents:* To the extent that the contentions described above do not constitute literal infringement of this element, they constitute infringement under the doctrine of equivalents under the following three theories because any differences between the claim element and the features of the Accused Instrumentalities are insubstantial. • theory 1: The detection current received by the access device (powered devise) is equivalent to a low level current because, for example, it (a) is power current (as opposed to a data signal) that performs the same function—generates a response from a powered device (access device), (b) in substantially the same way—over the data signaling pair, (c) to obtain substantially the same result—it is used to determine whether the power sourcing equipment (data node) should deliver operating power to

	the powered device (access device) over the data signaling pair. • theory 2: To the extent that the power sourcing equipment apply a voltage and subsequently measure a signature current, applying (or delivering) a low level voltage and measuring a signature current is equivalent to applying (or delivering) a low level current and measuring a signature voltage because (1) from an electrical perspective, delivering a current and measuring a voltage is equivalent to delivering a voltage and measuring a current, and (2) it (a) performs the same function—creates a response from a powered device (access device), (b) in substantially the same way—*e.g.*, over the data signaling pair, (c) to obtain substantially the same result—*e.g.*, it is used to determine whether the power sourcing equipment (data node) should deliver operating power to the powered device (access device) over the data signaling pair. • theory 3: To the extent that the power sourcing equipment apply multiple (*e.g.*, two or more) detection currents / voltages and subsequently sense (element [c]) and control (element [d]) based on the resulting currents / voltages on the data signaling pair, using multiple detection currents / voltages is equivalent to applying a single current / voltage because, for example, it (a) performs the same function—creates a response from a powered device (access device), (b) in substantially the same way—over the data signaling pair, (c) to obtain substantially the same result—it determines whether the power sourcing equipment (data

	node) should deliver operating power to the powered device (access device) over the data signaling pair. • The doctrine of equivalents applies to any one of the three theories individually or any combination of two or three theories.
[e] receiving at said access device controlled power supplied by a secondary power source arranged to supply power from the data node via said data signaling pair to the access device, in response to a preselected condition of said voltage level.	*Sample evidence (HP statements, depictions, and other documentation) includes*: • *See* Claim 6, element [d]. *802.3af, 802.3at, and 802.3-2008 Standards statements and depictions include*: • *See* Claim 6, element [d]. *Identification*: This element involves (a) "receiving at said access device controlled power supplied by a secondary power source arranged to supply power from the data node via said data signaling pair to the access device," (b) "in response to a preselected condition of said voltage level." • (a) receiving at said access device controlled power supplied by a secondary power source arranged to supply power from the data node via said data signaling pair to the access device: Receiving controlled power supplied by the secondary power source (addressed above) to the access device (powered device, addressed above) is receiving power that is increased, maintained, or decreased power supplied by the secondary power source to the access device, either (a) via the valve or switch (under *theory 1* for the secondary power source), or (b) by increasing the

	power delivered from the main power source (under *theory 2* for the secondary power source). • (b) <u>in response to a preselected condition of said voltage level</u>: The power from the secondary power source is controlled based on a preselected condition of the voltage level. The preselected condition is a voltage level on the signaling pair, chosen as part of the design of the power sourcing equipment (data node), that indicates whether a powered device (access device) is able to accept remote power from the data node, whether remote power should be maintained, or whether remote power should be removed. The power sourcing equipment (data nodes) contains circuitry that examines the voltage level on the data signaling pairs in response to a series of low level currents (detection currents, addressed above). These voltage levels are compared to a set of values previously stored with in the circuitry. If the signature of this series of voltage levels falls within the range of conditions which have been preselected, then the power sourcing equipment (data nodes) increases, maintains, or decreases the power over the data signaling pairs. <u>*Doctrine of equivalents*</u>: To the extent that the contentions described above do not constitute literal infringement of this element, they constitute infringement under the doctrine of equivalents under the following two theories because any differences between the claim element and the features of the Accused Instrumentality are insubstantial.

	• theory 1: To the extent that the power sourcing equipment apply a voltage and subsequently sense a signature current, applying (or delivering) a low level voltage and controlling the power supplied by the secondary power source in response to a preselected condition of the resulting current level is equivalent to applying (or delivering) a low level current and controlling the power supplied by the secondary power source in response to preselected condition of the resulting voltage level because, for example, it (a) performs substantially the same function, (b) in substantially the same way (*e.g.*, using power rather than a data signal), (c) to obtain substantially the same result. • theory 2: To the extent that the power sourcing equipment apply multiple (*e.g.*, two or more) detection currents / voltages and subsequently sense (element [c]) and control (element [d]) based on the resulting currents / voltages on the data signaling pair, using multiple detection currents / voltages is equivalent to applying a single current / voltage because, for example, it (a) performs substantially the same function, (b) in substantially the same way (*e.g.*, using power rather than a data signal), (c) to obtain substantially the same result. • The doctrine of equivalents applies to either of the two theories individually or together in combination.